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PRESSES AND DIES.

A COMPLETE DESCRIPTION OF THE ART OF DRAWING AND STAMPING.

BY STAMPER.

(In Several Parts—Part 1.)

It is the exception that proves the rule. The old adage, "there is nothing new under the sun," is true only in the light of the exception, and the exception is nowhere more pronounced in the present day than in the rapid strides toward perfection which have been made in the working of sheet metals into commercial articles by means of presses, dies and kindred tools.

An aim of the present generation is to try to regain a knowledge of the lost arts. Many marvelous mechanical feats were accomplished by the ancients of which we have no understanding, and many wonderful arts which they knew have been lost to us; but it is interesting to know that the art of the stamper can be traced to the beginning.

The crude coins of the Caesars do not compare at all favorably with those produced in our mints, and the hand-hammered vessels which Tubal Cain and his contemporaries took weeks to make would hardly meet the requirements of the modern housewife who can now replenish her entire kitchen outfit with the most approved sanitary ware for a few dollars.

FIG. 1. MODERN INDIAN HAND-HAMMERED WORK.

This advance from making one article in a number of days to producing thousands of similar articles, but of a much superior and more uniform character, in one day, has been a gradual growth; but the art has now reached such a state of usefulness that a very large number of articles are made of sheet metal, which but a few years ago were produced, or would have been produced, by casting, forging, or in the lathe, milling-machine, drill-press or at the bench.

The demand for cheaper goods and the great desirability of uniformity of product and interchangeability of parts have had much to do with the development of these methods. Forming and stamping operations, especially, have become in many classes of work very complex, and the art of drawing sheet metals has reached a high state of perfection and usefulness. Automatic

FIG. 2. MODERN STAMPED WARE.

machines and auxiliary devices for feeding sheets and strips of metal and for other purposes, having in view rapidity and economy of production, have also been invented and brought into service.

It is hard indeed to conceive the number of articles produced wholly, or in part, at least, in dies. The superiority of such articles is unquestioned and, as has been stated, their cost is but trifling as compared with those manufactured in any other manner. The many varied uses for presses and dies have constantly grown on us until now we are very largely indebted to this class of tools for our personal wear and ornaments, our light machinery and instruments; to numberless things which enter intimately into our every-day affairs; and last, but by no means least, for our domestic and culinary utensils. See Fig. 2.

The subject of the various types of dies, and the many different operations performed in them, is, therefore, such a voluminous one that we will be unable to consider but one branch of it in this article. Perhaps the most interesting as well as the most important use for dies is in the manufacture of the modern seamless-drawn

kitchen utensils. We will try to show the operations required to make some of the most common of these seamless-drawn articles.

In order to obtain a little clearer understanding of the various operations involved it will perhaps be best to first consider the outline in Fig. 3, irrespective of any dimensions. The first operation shell is drawn from the flat with an "outside" blank-holder (Fig. 4), but all the others with "inside" blank-holders (Fig. 5), which hold the partly finished article at its lower level edge; while the punch draws it into a deeper shape of less diameter. The object of the blank-holder is to keep the shell from collapsing during the drawing, thereby preventing undesirable wrinkles.

Drawing and re-drawing dies are most often made of a special grade of cast-iron, treated in such a manner as to give a very dense and uniform texture to the metal at the working surfaces. Sometimes, however, steel rings

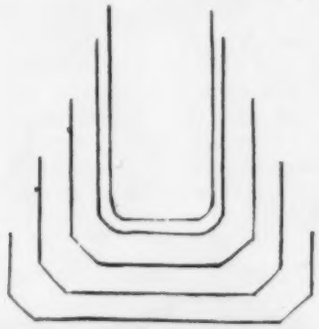


FIG. 3.

are set into the dies (Fig. 6), and the blank-holders made of steel castings, which add considerably to the durability of the tools. For articles which have to be very accurate in diameter a hard steel "sizing" punch and die are sometimes used after the last drawing operation.

The number of operations required to produce a given piece depend upon its shape, the thickness and quality of the metal, and other conditions, but for plain round articles made of a good drawing brass it is safe to figure that the first operation can be equal to one-half the diameter of the first shell; the second depth equal to three-fourths of the diameter of the second shell; the third depth equal to the diameter of the third shell; and the fourth shell about one-quarter deeper than the diameter of the fourth shell. It is impossible to give any rule as to how this die would affect the depth of the shell, as it would depend not only on the reduced diameter of the die, but also on the fit of the punch, which may be such as to reduce the thickness of the wall of the shell and thereby cause the metal to "flow" up the punch and make the shell considerably deeper than it would otherwise be. In this connection it might be well to state that the only place where the original thickness of the blank is maintained is at the bottom of the shell, or where the metal has not been destroyed. As it is true that there is no perfect balance, so is it also true that the thickness of the sides of the shell varies. While the sides may have practically the same thickness as the bottom, the dies can be so constructed as to decrease the gauge of the wall, or to increase it. The general practice is to construct the dies to produce a uniform thickness, but this causes the shell to be a little thicker at the top, due to the crowding together of the edges of the blank.

The blank is most often cut in a circle shear, but sometimes for the smaller work a cutting edge is put on the first operation blank-holder and die. Fig. 7. This enables the operator to first cut the blank from the sheet and then to draw the shell without any intermediate handling. This is due to the fact that in adjusting the blank-holder slide for blanks larger than 12 inches, it is sometimes necessary to have one side lower than the other on account of the varying thicknesses of metal to be drawn, and the uneven wear of the dies. This throws the slide out of alignment, and while it does not materially interfere with small work, the difference quickly multiplies as the diameter of the blank increases.

The manner of holding the various parts of the complete dies (A. B. and C.) depends largely on the construction of the machinery and the ideas of the die-maker.

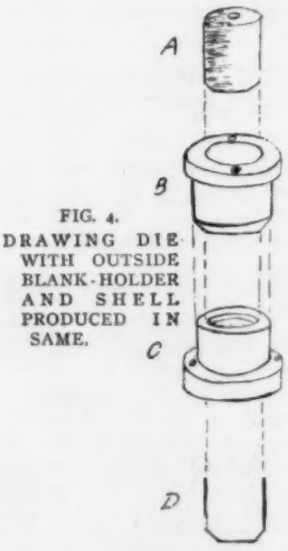


FIG. 4. DRAWING DIE WITH OUTSIDE BLANK-HOLDER AND SHELL PRODUCED IN SAME.

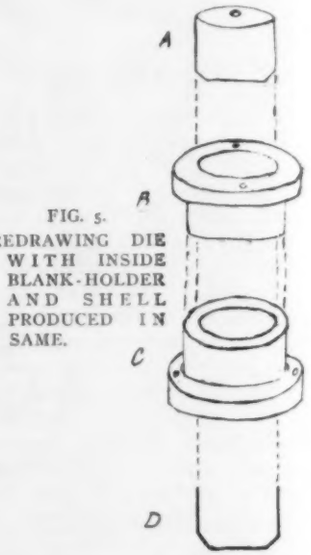


FIG. 5. REDRAWING DIE WITH INSIDE BLANK-HOLDER AND SHELL PRODUCED IN SAME.

In Figs. 4 and 5 we show the dies arranged to be held in the press as follows:

A—Punch. To be screwed on stem or inside slide.

B—Blank-holder. To be bolted to the outside slide.

C.—To be bolted to the bed.

The dies shown are of the "push through" type, which is most common. When desired the dies can be constructed with a "lift out" pad. It is more particularly used on taper work.

A simple rule for finding the diameter of the blank is the following: Multiply the circumference by the height, then add area of bottom, which gives area of blank. Next find diameter of circle whose area is equal to the area found. Example—Find the diameter of a blank for a shell 3 inches diameter by 2 inches in height.

3146	
3	diameter
9438	
2	height
18876	area of sides
7068	area of bottom
25944	Total area—5.75 diameter of blank.

Areas of circles can be found in almost any engineering book. This rule, of course, does not take into consideration any stretch of the metal. There are many other rules for finding the blank diameter and some of them will be considered later.

The reader who is familiar with the shapes of jelly-cake tins, pie plates, milk pans, pudding pans, sauce pans, berlin kettles, preserve kettles, dish pans, rinsing pans, water pails, pitchers, tea kettles, drip pans, milk cans,

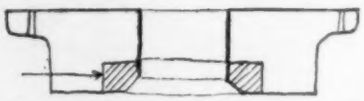


FIG. 6. DRAWING DIE, WITH STEEL RING.

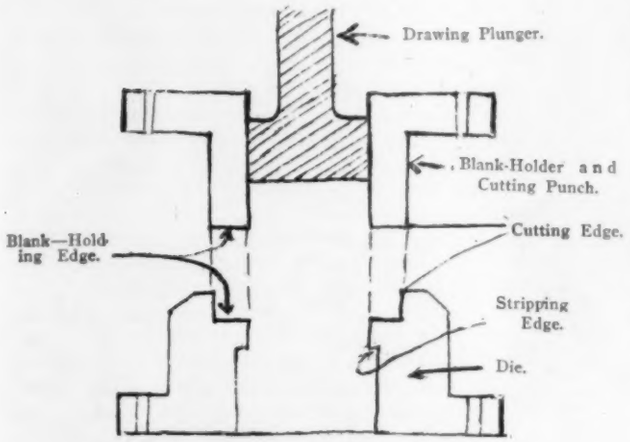


FIG. 7. DRAWING DIE, WITH CUTTING EDGE.

etc. etc., will now be interested in following these various articles as they evolve from the plain round blank to the desired shape ready for tinning or enameling, as the case may be.

While much of the foregoing applies directly to steel, of course the non-ferrous metals can be treated in exactly the same manner and with practically the same tools.

(To be Continued.)

THE CYANIDE TRUST IN GERMANY.

United States Consul-General Robert P. Skinner, of Hamburg, advises that according to information, the manufacturers of cyanide of potassium and cyanide of soda in Germany have pooled their American interests, and arranged with a certain New York firm to act as their agents. They will not sell to other American firms. The agent of the manufacturers' combination is located in Hamburg. The consul also gives the name of another Hamburg firm through whom American purchases might be made. (All these names are recorded at the Bureau of Manufactures.)

NO CUT IN DUTY ON CHIMES.

Effort to Import Them as Parts of Clocks Fails on Appeal.

According to an interpretation of the tariff law made recently by the board of general appraisers, the provision in paragraph 191 of the Dingley act, for clocks and parts thereof, does not include devices separately imported, which are susceptible of use other than as parts of clocks. The decision was directed to importations of chimes, which Niebrugge & Day entered.

The collector assessed duty at the rate of 45 per cent. under the metal schedule. The importers asserted the tax should be 40 per cent. as "parts of clocks," in view of the fact that they can be used on clocks.

The importers admitted that the chimes were used as door chimes, as well as in clocks. No alteration, it was admitted, was necessary to adjust the chimes to doors. This admission, General Appraiser Sharretts holds, is fatal to the claim that the articles are "parts of clocks."

PLATERS' WRINKLES.

By C. H. Proctor.

(Continued from January number.)

NICKEL PLATING BATHS.

In nickel plating plumbers' hardware and other classes of goods of the cast, brass or bronze variety, especially if tin is used in their composition, the nickel deposit frequently peels from the surface; although upon articles made from sheet metal this result is not experienced in the use of the same bath. The operator looks for the cause of the trouble, sometimes he discovers it, oftentimes not. Tin is used in the composition of the metal to produce sounder castings. When such articles are cleansed after polishing by potash solutions or their combinations, especially in boiling solutions, an oxide of tin is produced upon the surface of the article, by the action of the alkalies. This is not always noticeable; but yet it is sufficient to prevent the true adhesion of the nickel deposit.

Cyanide of potassium, unless unusually strong, will not remove it. A 2 or 3 per cent. solution of muriatic acid in water will be found valuable in many cases for reducing slight oxidizations very quickly, in preference to the more concentrated and expensive cyanide dips.

BRASS AND BRONZE BATHS.

When a brass solution produces a bronze or low brass tone, it does not need zinc or ammonia, but copper. If the brass foundry alloys are studied it will be found that two or even three parts of copper to one of zinc give yellow tones; also equal parts of these metals produce bronze or reddish yellow colors. If this is borne in mind, considerable trouble from white or grayish brass colors will be avoided. Add only copper after a bath is once prepared, when metal is necessary. If the deposit should then show a reddish or bronze tone, a little carbonate of zinc mixed with water of ammonia, 6 deg. Baumè and stirred in the bath will produce a good brass color.

Avoid adding too much arsenic to a brass solution, for grayish tones are produced. It will be found impossible to produce a rich lustre by the acid dips when much arsenic is contained in the brass deposit. Oftentimes a brass deposit, when acid dipped, will save considerable labor in scratch brushing, especially in gilded finishes, where a rich background is necessary.

In plating cast iron, if the deposit peels, or is not clear, add three or four ounces of sal soda to each gallon of solution or one or two ounces of bisulphite of soda.

A little water of ammonia added to a brass bath will frequently clear the deposit, especially when muddy, thus avoiding the use of arsenic.

Bronze baths, also brass baths when made up new, are best prepared, first as a copper bath, and then a concentrated solution of carbonate of zinc in cyanide of potassium, one part of the former to two of the latter, added until the desired color is obtained. This is best accomplished by trial.

A copper solution, containing one-quarter ounce or less of zinc in each gallon of solution, will produce a better and brighter deposit. If the bath deposits a muddy color, add about two ounces of hyposulphite of soda.

(To be Continued.)

THE RECOVERY OF PRECIOUS METALS FROM JEWELERS WASTE.

AN EXHAUSTIVE TREATISE ON THE SUBJECT, INCLUDING ALL FORMS OF WASTE.—TO BE CONTINUED FOR SEVERAL ISSUES.

BY JOSEPH CAUFFMAN.

(Continued from January number.)

TUMBLING.

The sweeps are put into a tumbling barrel, which knocks the gold and silver off the iron and other substances and breaks the material up into small particles. Tumbling barrels are of different kinds; they usually consist of an iron cylinder revolving on an axis; this cylinder is about the size and shape of a barrel, and contains either loose iron balls, which knock together and break up the sweeps; or blades attached to the axle inside of the barrel, extending almost to the sides, as in an ice-cream freezer. The barrel is then turned for a sufficient time, when the mass is dumped out and put through a sieve. Any material that will not pass through is put back and ground over again; if only a small lot, this can be done in an iron mortar. This is again sieved. The fine unbreakable residue consists of iron and other metals—brass and copper, etc., with some larger pieces of gold and silver. All large pieces of iron are taken out and brushed free of any valuable metal that may be sticking to them, which is put with the sieved sweeps, if it will go through the sieve; if not, it is put with the larger pieces of gold and silver. The iron, when clean, is thrown away, but as there usually remains some gold and silver in any holes or cracks that it may have, it is kept with similar material, and finally put into the lead furnace. When sweeps are reduced in large quantities, iron is necessary in certain furnace charges, and is therefore valuable, and as it dissolves, any adhering gold or silver are taken up by the lead, to be recovered later.

JOSEPH CAUFFMAN.

If there should be any large pieces of copper or brass in the sweep residue, they can, after brushing, be cleaned with dilute sulphuric acid and saved for their own value, the washings being evaporated and added to the sweeps. Small pieces of iron, not big enough to pick out by hand, are to be removed by drawing a magnet through the mass several times; these should also be brushed off for small particles, and finally thrown into a furnace melt, as with the larger pieces. If there are iron *filings* present, these will do no harm if the entire lot of sweeps is to be ultimately run through a lead furnace; but in any case where they are to be melted in a crucible, especially with very valuable material, filings would be very harmful, and must be removed as described later.

TUMBLING BARREL FOR GRINDING THE BURNED REFUSE.
Manufactured by O. J. Mousette Company.

ASSAYING.

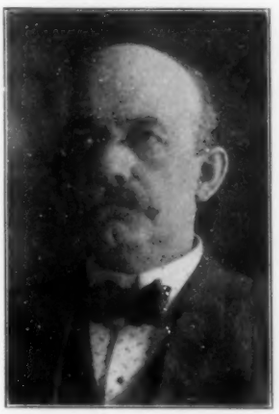
After the above foreign metals have been removed, the residue will consist of large and small pieces of gold and silver in both solid and plated form. These cannot be assayed as they are, so they must be melted down together in a crucible, and can then be directly refined, and the gold and silver separated or "parted," as the process is called. If, however, a report is required by the owner at once, a sample is cut from the ingot obtained, and this is assayed. It is weighed and cupelled with sheet lead, till all the metal is burned off but gold and silver. This metal is "parted" by dissolving the silver in weak nitric acid and boiling the remaining gold in strong acid and drying, heating red, cooling and weighing. The weight of the gold is subtracted from the weight of gold and silver together, the silver representing the difference. From this, and the weight of the sample cut off, the contents of the ingot are calculated, and this is finally added to the value of the sieved sweeps to determine the total value. (A full description of cupelling and parting can be found in all text-books on the metallurgy of gold and silver.)

(To be continued.)

ASSAY FURNACE.
Manufactured by American Gas Furnace Company.

THE DISTRIBUTION OF ANODES.

By J. H. Russell.



J. H. RUSSELL.

It has been the custom for many years back, in all plating rooms of any size, or where there were plating tanks wide enough to be equipped with three rows of anodes, for the purpose of making one tank do the work of two, for the foreman, in placing the anodes in the tank, to take particular care that there was an equal number of anodes on each rod. The fact that when the anodes were taken out and cleaned, after a certain length of time, those on the centre rod were the most used up, did not strike the average plater of being of any consequence, and, from the standpoint of the average plater, it was not, for in many places the quality of the deposit, especially nickel, was judged mainly by appearance, and the fact that it did not "cut through," while being nickel buffed. If the deposit stood that test, it was all right. But when objects are to receive a deposit of nickel sufficiently heavy to stand a certain specific test, it is an entirely different matter.

In the concern where the writer had charge of the finishing departments for a number of years, the above conditions confronted us. Our customers specified that all nickel plated parts must meet a certain acid test. Nitric acid C. P. was diluted to a certain specific gravity, and a drop applied to the surface of the article, and if the deposit was eaten through in less than ten minutes, it was rejected. For a number of years, six minutes was the required length of time for the deposit to stand up under the test and then the matter was brought up only about once a year, but finally the time was increased to ten minutes and steps were taken to see that all work met those requirements.

The inspection department was directed to make periodical tests, and they obtained two or more pieces from each load that was being plated, noting the conditions under which the work was plated. Voltage, amperage, length of time, density of solution, and number of pieces in the load, as well as the tank number in which said load was plated. The writer has cause to remember all these details, for it was the beginning of days of trouble, for invariably two pieces taken from the same load would behave differently. One piece would stand up for ten or perhaps fifteen minutes under the test, and the other would break down in four minutes or even less. Pieces were taken from different racks in the tank, and with the same result. Pieces taken from the same rack would show the same result. Even one piece would stand the test better on one side than the other.

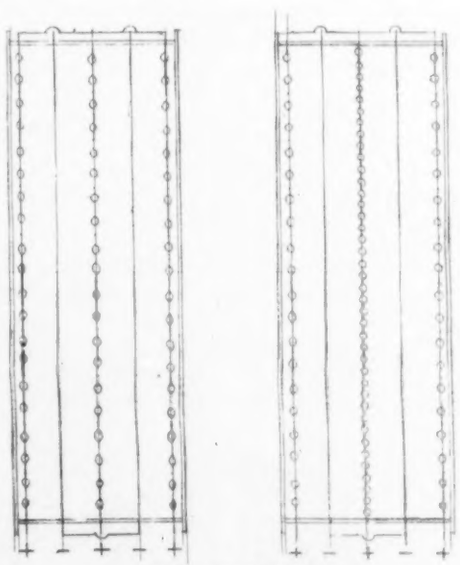
Sometimes samples would be taken from a load plated under certain conditions and all would stand the test and more, samples were again taken from another load plated in the same tank and under exactly the same conditions, and none would stand the test. It may be said in passing, that all of these tests were made on pieces plated in double tanks, that is, tanks that contained three rows of anodes, which were distributed equally on each rod. It might also be said that the anodes used were the elliptical type.

The experiment was then tried by taking samples from a single tank, that is, one that contained two rows of anodes, and one cathode rod. The density of the solution was the same as in the double tank, the voltage also the same, there were half the number of anodes, and the amperage was, of course, proportionate to the load. The load was allowed to remain in the tank for the same period of time as before and all the pieces showed a uniform deposit. The experiment was repeated and with the same result.

The next experiment consisted of marking pieces and placing them in the tank so that some were on the side of the racks nearest the center row of anodes, and the others on the side nearest the side row of anodes. The load was plated under exactly the same conditions as before, and the result was that those pieces nearest the middle row of anodes did not stand the test and those on the outside did, and more. This was repeated several times and invariably with the same result, revealing the secret.

In this particular tank were 75 anodes, 25 on each rod, and a load required 150 amperes to obtain the required deposit in a given time. An ammeter placed in series with each rod showed 50 amperes, or one-third of the total current, going through each row of anodes, and as it is a well-known fact that an electric current flows through the path of the least resistance the greatest resistance was in the center row of anodes, for while the work nearest the outside anodes received the full benefit of the 50 amperes, that on the side nearest the center received but half or about 25 amperes, for the current passing into the bath at that point was divided and flowed in both directions.

FIG 1 FIG 2



PLAN OF TANKS.

Fig. 1 represents the top view of a plating tank 10 feet long and 3½ feet wide, and showing three anode rods, designated by the plus sign + and two cathode rods, designated by the minus sign —. It also shows the old and incorrect manner of placing the anodes in a double tank; an equal number on each rod.

Fig. 2 shows a tank of the same dimension and with the anodes placed 40 on the centre rod and 20 on each side rod, making 80 in all. This is the correct way to place anodes in a double tank.

METHOD OF INSTALLING THE THREE-WIRE SYSTEM OF CURRENT DISTRIBUTION IN ELECTROPLATING.

And Wiring to a Ten-Point Voltmeter Switchboard.

By Royal F. Clark.

With the coming in vogue of the electric cleaner and mechanical barrel-plating apparatus, comes the application of the plating dynamo capable of generating two voltages at the same time, viz., five and ten volts. Its distribution is commonly called the three-wire system. The main rods are three in number, one is positive, one negative and the other is called the neutral. From the mains only two wires are connected to the plating tanks.

ROYAL F. CLARK.

From these three wires it is possible to obtain three separate circuits or mains; two five and one ten volt circuit. By taking a wire or line from the positive rod and one from the negative ten volts are at command, which is suitable for electric cleaners and plating apparata. Further by attaching a wire to the positive and one to the neutral rod, which is the negative in this case, a voltage of five is obtained; also a wire from the negative and one from the neutral rod, which in this case would be positive five volts, is at hand which is applicable to copper, brass and nickel solutions, etc. It is readily seen that the neutral rod is both positive and negative at the same time; a condition which would seem impossible; nevertheless it is true and practice has proved it so.

When installing the three-wire system, it is customary to place the neutral rod between the positive and negative. When connecting several tanks to the three-wire system, the load should be equalized, that is, the same number of tanks should be connected to each of the three circuits. The ampere capacity drawn from the three circuits should be balanced as near as possible. The writer has had considerable experience in equipping modern up-to-date plating departments with the three-wire system of current distribution, and desires also to describe the method of wiring from tanks and mains to a stationary voltmeter, used in reading the voltage of any number of tanks on the three-wire system. The volt-meter should be mounted on a board, carrying a ten or fifteen-point switch. A feature which the writer has found to give entire satisfaction is in the form of a single pole knife switch, and enables the plater to read either of the two five-volt circuits from only one point on the board. The illustration Fig. 2 shows fully the method of connecting the wires from the mains to the binding posts on the board and from the tanks to the board.

One copper wire (size about No. 16 or No. 18) is attached to a point on the wire extending from the rheostat to the cathode or negative rod of a tank to the binding post No. 3 of the numbers indicated on the board. One wire is attached to a point along the line of the anode or positive rod to an end connection A of the knife switch. From the center connection B of the switch, a wire is run to the positive terminal on the voltmeter board. Also extend a wire from the neutral rod of the mains to point No. 2, also to other end connection C of the knife switch. Now by having the knife switch placed vertically on the

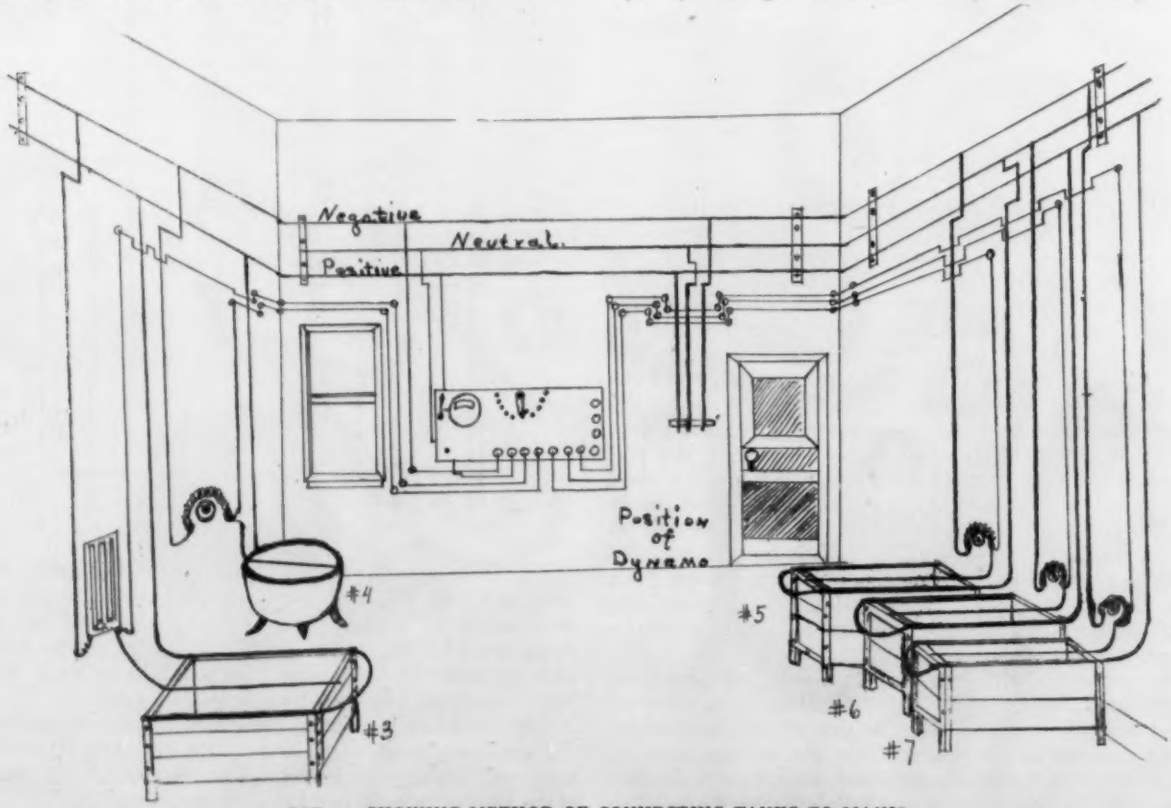


FIG. 1. SHOWING METHOD OF CONNECTING TANKS TO MAINS.

board, and throwing the switch up and placing pointer on No. 1, the voltage shown on the dial will be that of the positive and negative mains, which would be ten volts. By leaving the pointer on No. 1 and throwing the switch down, the reading is of the mains composed of the neutral positive and negative. Having the switch up and pointer on No. 2, one can read the voltage of the mains made from the positive and neutral negative rods.

The larger illustration shows the wiring, which the writer installed in the plating room of a large manufac-

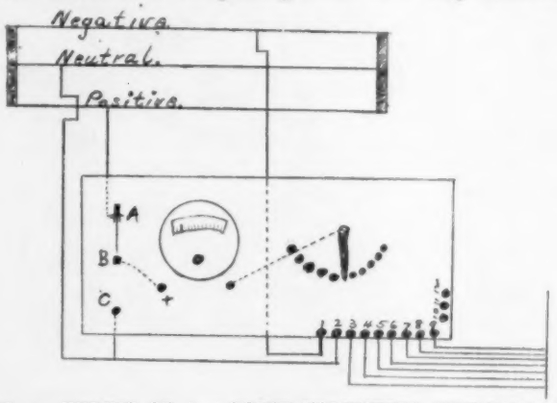


FIG. 2. WIRING OF A 10-POINT VOLTMETER SWITCHBOARD.

turing plant. By having a card describing each point of contact, also whether the knife switch should be thrown up or down, when reading that particular point, the plater can, at a glance, read the voltage of any tank he desires. By a careful study of the diagram in the illustration, one will become more familiar with the method of wiring. The above applies to ampere reading also. If desired, a separate wire need not be run from each tank, to a point on the board, but to a "common line" wire passing near each tank, and which is connected to each terminal which designates a tank. This necessitates having a small single point switch at each tank, and when desired to read that particular tank, this switch must be closed, then left open in order to read some other tank.

METHOD OF DETINNING TIN SCRAP.

The recovery of the tin from a piece of tinplate, after the article of which it is made has served its period of usefulness, has long been the subject of chemical and metallurgical research. Numbers of patents have been issued covering all sorts of processes with this end in view. Many and varied have been the schemes evolved, some of them most ingenious in character, but, however, they have been only successful in a limited degree.

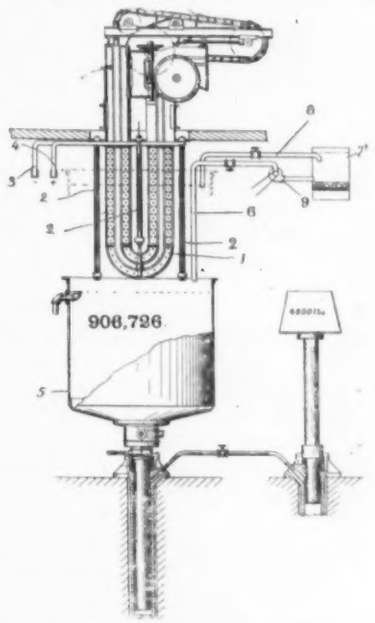
Thousands of dollars have been sunk in plants to operate certain processes which seemed to have special advantages. Ever since 1876 electricity has been an important factor in the operations. To this form of electro-chemical process belongs the method covered by Letters Patent Nos. 906,726 and 907,061, granted to Meredith Leitch of Elizabeth, N. J., under date of December 15, 1908. This inventor claims to have eliminated many of the defects common to most of the apparatuses in use at the present time.

He has aimed to produce a machine that will carry on the detinning process with more speed and accuracy than formerly, and also to be able to inspect all of the internal parts once in twenty-four hours at least. Moreover he has endeavored to provide means to make the electrical connection permanent without interfering with such inspection or the removal of the deposit from the cathodes.

The inventor has also found that, in ordinary practice where a circulating electrolyte is employed, such as caustic soda, the carbonic acid gas in the air unites with elements in the soda, causing it to carbonate, and consequently deteriorate. When the electrolyte circulates in the usual way, waterfalls are produced and air is entrained during the circulation, so that a large amount of air is thus brought into contact with the electrolyte and the carbonating and consequent deterioration takes place rapidly.

Just how well Mr. Leitch has succeeded in his attempts will be seen at a glance by referring to the cut herewith shown.

Fig. 1 is a basket containing the tin scrap to be de-



DETINNING MACHINE.

tinned and having a suitable conveyor to cause the scrap to pass through the detinning bath.

Fig. 2 are cathode plates upon which the tin removed from the scrap is deposited.

Fig. 3 and 4 are circuit terminals connected to the basket and cathode plates respectively and supplied with electricity from any suitable source.

Fig. 5 is a tank containing the electrolyte in which the scrap and cathode plates are immersed.

Fig. 6 is an outlet pipe leading to a heating tank 7, and so arranged as to draw the electrolyte from near the bottom of the tank 5, and discharge it in proximity to the bottom of the heating tank 7.

Fig. 8 is a return pipe leading from beneath the surface of the electrolyte and the heating tank 7 and discharging beneath the surface of the electrolyte and within the detinning tank 5.

The electrolyte used is caustic soda and it is caused to circulate by the pump 9 situated in the pipe leading from the bottom of the detinning tank to the bottom of the heating tank. By this arrangement no waterfall is produced and consequently no air is entrained and the only portion of the electrolyte exposed to the air being that on the surface of the two tanks, which is small.

As the tank used is capable of being raised and lowered, the cathodes are automatically cleaned, being scraped of the deposit by scrapers, which are carried by the tank and thus pass over the cathode plates as the tank descends. Furthermore the cathodes are so constructed as to afford a very large surface for deposition, resulting in a very low amperage as is desirable in such an apparatus.

COPPER ROLLING MILL PRACTICE.

A Series of Articles on the Subject.

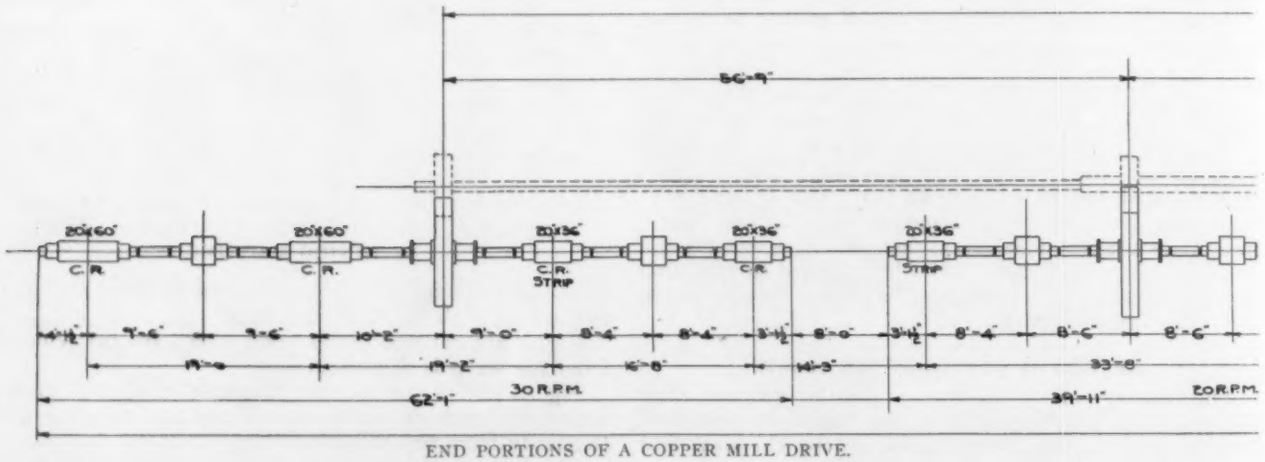
By Copperman.

(Continued from January number.)

BRASS MILL DRIVE.

In this method, as stated before, the engine is connected by gears, belt or rope drive to a cellar shaft, running to near the extremes of the train. Usually four or six pair of rolls make a group in a copper mill, while in a brass mill it is commonly but two, thus making every pair accessible, front and back, to a truck. This system of drive costs more to install than the direct drive, and also requires more power to overcome friction. The friction load of a mill of this kind will average 12½ to 15 h. p. per pair of rolls. In a mill of this type the breaking down rolls can be placed anywhere, usually near or at the end, where, as a rule, it is cooler for the men to work, and also allows of the laying out of the work so as to carry it down through the mill, from roll to roll, as may be required, finishing up at the other end, on the cold rolls, and going to the finishing department placed at the end of the building.

NO. PAIR.	NO. PAIR.	SIZE.	USED FOR.
2	{ 1 — 22 in. x 60 in. 1 — 24 in. x 60 in. }		Breaking down cake.
2	2	22 in. x 60 in.	Slabbing or roughing and finishing.
7	{ 2 — 20 in. x 44 in. 4 — 22 in. x 60 in. 1 — 24 in. x 84 in. }		Finishing, or roughing and finishing.
1	{ 30 in. to 34 in. x 128 to 144 in. }		Heavy brazier sheet.
1		30 to 34 in. x 72 in.	Wide polish packs.
3	{ 2 — 20 in. x 60 in. 1 — 22 in. x 72 in. }		Cold rolled sheet.
4		20 in. x 36 in.	Strip rolling.
4	20 in.		Pinions.
4	22 in.		
1	24 in.		
1	30 in to 34 in.		



END PORTIONS OF A COPPER MILL DRIVE.

Mills can be run at any speed required for a group, and can easily be kept lined up. This makes it possible to run large mills at their best working speed, and a break, anywhere, causes but little delay on the other rolls. Strip rolling can be done on the same sized rolls as used for brass in the brass mill, and it reduces the spares in rolls, pinions, spindles and boxes, to a few sizes, the same being right for the brass mill as well.

STYLE AND CLASSIFICATION OF MILLS.

The rolls are generally of the counter-weighted top roll or loose mill type, with occasionally a friction or tight mill. Much can be said descriptive of the mills proper, and a wide range in size, speed and uses will be found. No two concerns seem to be much alike in these respects, each one going ahead and working out their own salvation, finally developing mills that are individual. The mills may be divided into breaking down, slabbing, finishing, large sheet mills, heavy mills for cold rolling packs for polished copper, cold sheet rolls, and strip rolls. As an illustration of a typical mill, a division of rolls in a plant of say twenty pair total would be within the bounds of present practice if laid out as in the following table.

COMPARISON OF COPPER AND STEEL MILLS.

Before taking up each of the roll divisions and going over particular features, I wish to draw a comparison between the equipment of such a plant as illustrated, and of a modern sheet steel mill. To begin with, the construction all the way through in a copper mill is much lighter. Housings are all cast iron, medium weight pattern, with a very few cast steel pinions, spindles and boxes. Screws for breaking down rolls are universally 1 inch pitch, with many finishing rolls the same, although there are a few ½ and ¼ inch pitch screws in use. Rolls are much longer in proportion to their diameters than in steel mills 20 x 60 inches, with 13 inch necks, 22 and 24 inches with 15 and 16 inch necks, whereas 26 x 36 inch rolls with 20 inch necks are common for sheet steel.

Again, the rolls are of lighter chill and of different contour. In sheet steel and tin plate mills the rolls are usually changed on a Saturday afternoon or Sunday, and a newly turned pair put in for the following week's run from Monday a. m. to Saturday p. m., a continuous run of sixteen 8 hour shifts. They are turned, one or both, concave or "crossed," the amount depending on the

size of roll and width of sheet to be made, and are carefully warmed up by the first shift with crop ends of bars, then a few pieces and packs of narrow work, gradually getting them "up" to the proper condition to take the regular width to be rolled for the week. About Thursday afternoon the rolls get into a condition where the skill of the roller is required to "keep them up;" for by this time, from rolling one width so long, the rolls are tracked or "gutted" out considerably.

The secret of being able to roll continuously on this type of matching mill is that of driving the heat into the necks and housings, and even out into the wabbles, early in the week when the rolls are in their best shape, and later on in the week to hold all the heat due to the pieces and packs in the roll itself, so as to properly swell it into the right convex form. This latter is done by a more liberal use of neck grease, and in some cases by the use of a fine stream of water on the wabbles, seldom if ever on the necks. Early in the week the necks are run as dry as possible, so as to let them get hot and carry the heat to the housings, rollers sometimes throwing lime on the necks to absorb too much grease that the catcher or grease-boy may have put on them. On tin-plate mills, early in the week, the temperature of the roll necks often goes as high as 400 deg. Fahr., a temperature that will permit of only a very dense grease combined with a high flash test petroleum oil. Water is never allowed to get on the roll surface, except as has been tried for warming up, when the mill is started up slowly after midnight Sunday and hot water run on the rolls to save some of the time necessary to warm up, and thus be able to roll standard widths earlier in the day on Monday.

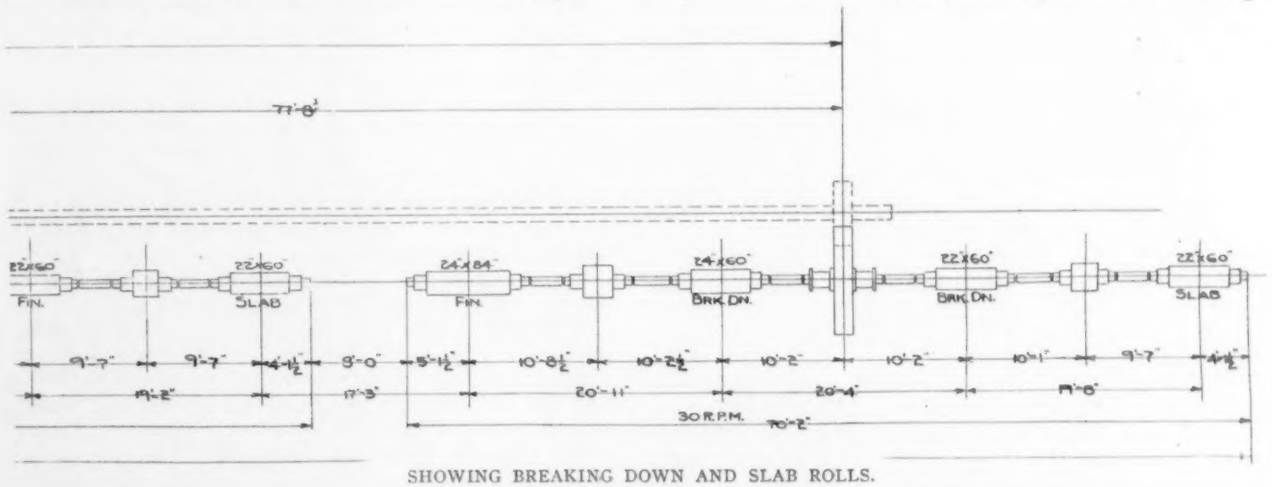
In direct contrast to this, every copper man knows it is customary in copper rolling mills to cool off the rolls after each heat, except on finishing mills where packs are rolled from pieces slabbed down on some other mill. In this case the rolls are dead cold to start with in the morning, and are warmed only by the packs which are practically cold when rolled, and impart heat slowly. Where pieces are roughed on the finishing rolls, as two heats morning and noon, the cooling down process is not carried so far after the second heat, just before finishing, and this amount of cooling depends on the roller as an individual, as well as on the particular shape of his roll and the width he wants to finish.

Copper mill rolls are flat or slightly crowned, and are run with a constant stream of water on the necks. The natural result of passing hot pieces through them, as in roughing, is to blow them up in the center to such an extent that their shape changes so much that they must be cooled off. The heat cannot travel to the necks, being held back by the water, and the only place left for radiation is the roll surface between the housings. At some future time we may discuss the methods of heating and rolling copper sheet, and go into the question of lost time per pair rolls, where pieces are roughed and finished on the same pair rolls, and rolls are served by but one furnace per pair. Going back to the different style of rolls going to make up a copper rolling mill, as per the classification given above, I will consider them in the order in which they were tabulated.

BREAKING DOWN.

Sizes range from 20x60 inches, as the smallest, with 22x60 or 64 inches as medium, up to 24x60 and 64 inches as the heaviest in common use. Late built mills, especially those put up by steel builders, are going in with fairly heavy housings and larger necks than a few years ago, with the added feature of supported spindles, so as to lengthen the life of couplings and spindles. For rolls of 60 and 64 inches length, the necks should not be under 15 inches on the 20 inch rolls, 16 inches on 22 and 17 or 18 inches on the 24 inch, to make them strong enough to stand the first few heavy passes that are usually rolled on the end of the roll.

All two high breaking down rolls are with balanced top roll, a few with side brasses, and all provided with a large hand wheel and cross shaft on top of the housings for adjusting the height of top roll. One breaking down mill is equipped with a motor for lowering the top roll, controlled by the roller, who can set it for the reductions required, and thus do away with one man, the ordinary screw man. Just here I wish to mention a similar device installed in one of the steel plants on a 22 inch plate mill, from which a very interesting and efficient scheme might be worked up, and applied to a copper mill. A motor, specially wound, is connected to the cross shaft, and so controlled that when a plate has entered the rolls and before it is through a button is pushed which closes the circuit on the motor. The latter cannot move the screws while the piece is in, but the very instant that it is through, and the pressure on the screws relieved, the motor immediately brings the roll down to the next set required, doing it automatically, quickly, and with absolute accuracy.



SHOWING BREAKING DOWN AND SLAB ROLLS.

(To be continued.)

The predominant alloy used by all the northern nations of Europe was gunmetal, containing from nine to twelve per cent. of tin, the typical alloy being composed of eleven parts tin and eighty-nine copper.

PLANT USED IN THE MANUFACTURE OF TUBES.*

By W. H. A. Robertson.

(Concluded from January number.)

CHAIN DRIVEN DRAW BENCHES.

The application of draw benches for the production of tubes is of such universal practice that it is hardly necessary to describe very fully the operation, and it will perhaps suffice to say that the shell is placed upon a steel mandril, turned to size and provided with flats and shoulders at each end, the shell being shouldered or collared at one end, in order to give entrance to the die and also to form the collar by which the shell is prevented from slipping along the mandril. The mandril is placed between the jaws of a dog or wagon, which is provided with teeth at one end; the teeth are inserted in the divisions of a built-up traveling link chain, thus pulling or drawing the shell through the die. When the whole length of the shell is drawn the mandril and wagon are run back and the mandril reversed and the operation repeated, only the die is replaced with a slip die, so that when the teeth of the dog are inserted the mandril is drawn through only and the shell left behind, the mandril being slightly tapered to facilitate the withdrawal. In cases where heavy tubes are drawn on parallel mandrils, and the tube is not taken off in this manner, the mandril with tube upon it is put through a reeling machine, which expands the tube and allows of easy removal.

In the above mention is only made of mandril-drawn tubes, but for parallel tubes it is more universal to employ plug or bulb benches. In this method no mandril is used, but an extention piece is fitted to the draw bench, and a rod is fixed at the extreme end by suitable nuts; the other end is provided with a bulb or plug, and the tube, which has been suitably pointed or tagged, is slid over the plug and the required die fixed in position, when the same drawing operation as before described is performed, only there is no necessity for withdrawing the tube, as of course the tube, when drawn, leaves the bulb which corresponds to the mandril behind.

In the design of chain-draw benches many points have to be borne in mind, the greatest of which, if I may say so, is the rough treatment in which they are subjected in the drawing-mill. If it were possible, in designing a bench, to know the exact reduction which will be given and not exceeded, and the nature of the material, all would be well, but, as pointed out previously, the shells are not received of a similar size; one may differ from another by ¼ or even ⅜ of an inch. The material may also differ in toughness. These points must then be borne in mind, and a very large factor of safety employed upon all the materials used in construction.

Considerable importance is attached to the foundations, which should be of very ample proportions; the ground-bearing surface of the bases should also be ample.

The chain, which is now universally made of high carbon steel, having a tensile stress of not less than 60 tons per square inch, should be accurately machined and fitted, and is run in a carefully-machined groove on the top of the bench and engages in a sprocket-wheel, generally of cast iron, but of better practice in steel, in which are fitted and keyed steel teeth, machined to fit the links of the chain into which it engages. At the other end of the bench, *i. e.*, the front or die end, a turned flanged pulley is fixed in phosphor bronze bearings. These bearings should have ample means provided for lubrication, so that the pulley can revolve with the chain. In many cases this is neglected, causing more resistance to the movement of the chain. The loose part of the chain under the bench should be carried on similar but smaller pulleys, and not allowed to drag on the ground. A good practice is to provide oil trays, through which the chain moves. This ensures thorough lubrication and a minimum of resistance.

The die plate, against which the die rests, is, in this country, a simple steel plate, having a slotted hole of sufficient size to allow the tube to pass through. This, of course, has the advantage of being cheap, but in the long run I am inclined to think it is productive of many troubles in the mill. In America this practice is not in use, and probably the reason for the non-adoption of the plain die-plate is as follows: In drawing, the ideal condition is to have the pull directly in a straight line with the centre of the mandril. This should then give a perfectly straight tube. Now, to produce this result, it is necessary to always have the die in the same place, but when drawing tubes of the same size with the plain die plate this is not possible, as the die can slip into any position, and will not adjust itself when the pressure is created.

With regard to the dog or wagon, there are many types in use. The general practice is to employ a boy to follow the wagon as it travels along the bench, and to bring it back to the die-plate when the tube is drawn. There have been attempts, and there are, I believe, in use arrangements by which the wagon is automatically returned. Below the bench is fitted a pulley upon which a rope or chain is wound and attached by its free end to the wagon. When the tube is drawn, the counterweights revolve the drum in the opposite direction and thus bring back the wagon to its required position.

I understand that in Germany the same result is accomplished by having the benches erected on an incline, so that when the tube is drawn the dogs run back down the incline, a spring or buffer preventing any shock to the front plate. In noticing this it may not be amiss to mention that all draw benches should be erected with a slight incline, as it facilitates the return of the dog.

The mandrils employed in tube drawing are generally of special crucible cast steel, turned accurately to size; the dies are of special die steel, and should in all cases be round and not square, for the reason that in hardening the hole tends to keep its shape better when having a circular periphery.

HYDRAULIC DRAW BENCHES.

A special type of hydraulic bench is in use for drawing large short tubes. In this the die head is of cast-iron of massive design, supported and connected to the cylinder by steel rods passing through castings which serve as struts.

The cylinder is made in two pieces and is carried on cast-iron supports. The piston is of cast iron, and is provided with recesses for square flax packing. The end of the piston-rod is provided with a cast steel punch holder, fitted with slippers which work in rigid guides attached to the bed plate of the machine.

The operations of the machine are as follows: The shells to be drawn are placed on the wooden table and pushed, one by one, into the feed slide just at the back of the die head. Upon entering the feed slide each case is gripped by wooden jaws operated by turning a handle, the feed slide then being moved over central with the die. The punch, held in the end of the piston-rod, comes up

*Paper read before the Institute of Metals.

and pushes the case through the die. The valves reverse the ram, and the case is stripped from the punch by the die. While one case is being drawn the next is placed in the feed slide. The action of the automatic valves is as follows: On the upper rail are mounted dogs which are connected by shafts to a small pivot valve. When a pin, carried by the cross head, moves one of the dogs, the accumulator pressure is admitted to one end of a cylinder carried on top of the main cylinder. The piston of this small cylinder is attached directly to the reversing valves, one of which is located on each end of the main cylinder, and its motion operates both valves, resulting in the reversal of the main piston. The operator has within reach a handle whereby he can reverse the bench at will. The dogs can be set so that the stroke can be varied in length or relative position as desired. There is a throttle valve which acts also as an alleviator and serves to regulate the speed of the bench. There should be a stop valve placed in the piping leading from the pipe line, and this should be used to stop the press.

The benches described are arranged to work from a three-throw hydraulic pump giving a water pressure of 3,000 lbs. per square inch, or from an accumulator system. The operations in the working of this bench are as follows:

The mandril is swung out to clear the die head and the shell put on; it is then pushed back and locked in position central with die.

The valve being turned on, the tube and bar are pushed through the die. The stripper is now interposed between tube and die head, and the tube is stripped from the mandril by reversing the machine.

The arrangement of valves is a very important feature in the installation of hydraulic draw benches, and requires a large amount of consideration.

SHOULDERING MACHINES.

For shouldering tubes preparatory to drawing there are several types of machines in use. In the more general the machine is driven by belt, and the reciprocatory motion of the dies is obtained by a cam on the main shaft, the dies slide in guides, and are of cast steel having the necessary taper. The taper on the tube can be altered by varying the distance it is fed into the die. The tube is rotated while being hammered.

Another type is an adaptation of the Ryder principle, and is similar in action, but is provided with several dies instead of only one.

SAWS.

For sawing shells and billets a heavy saw is necessary; the peripheral speed of the saw can be 10,000 ft. per minute with toothed saws. A saw should always be of very ample proportions, as owing to the high speed at which it runs and the heavy work it has to perform, it very soon gets out of good repair, which is dangerous as well as wasteful.

For ordinary sawing of finished tubes, a light saw bench is usually employed, but in nearly every case that has come under my notice the bearings have been very light, and trouble is always experienced in repairs. Ball bearings are eminently suited for application to saw spindles.

TUBE BORING MACHINES.

During recent years, when specifications have become so stringent, the boring of cast shells has become necessary, and to do this in an economical and efficient manner necessitates a powerful and well-designed machine. The machine has not yet received much attention from makers, but there is no doubt that an efficient machine is wanted. My firm are now building a machine, and after trials I hope to give the results to the institution.

For turning the outsides, the tubes after boring are put upon a mandril and turned in a high speed lathe; it is necessary, however, to put a smooth finish upon the turned billet, otherwise the tool marks will not draw out.

POWER REQUIRED TO DRIVE DRAW BENCHES.

It is difficult to lay down definite rules for the power required to drive benches, but approximately the power required is:—

$$HP. = \frac{T \times A \times S \times \emptyset}{33{,}000}$$

Where T = Breaking stress in pounds per sq. in.
A = Area in sq. in.
S = Speed of chain in ft. per min.
$\emptyset$ = A variable coefficient depending upon the size of the bench and gearing.

The efficiency of a double geared bench may be approximately 65 per cent., and for a single geared bench 75 per cent.

The above rule is approximate only, and gives a result in excess of the actual. It is, of course, understood that in drawing the reduction made should be as much as possible; that is, the pull exerted should be nearly equal to the breaking strain.

With regard to the speed of drawing, this, of course, will vary considerably with the material, but the following speeds represent up-to-date practice:

Tubes up to ⅝ in. and 16 G.	120 ft. per min.
⅝ in. to 1 in. and 14 G.	100 ft. per min.
1 in. to 1½ in. and 12 G.	70 ft. per min.
1½ in. to 2 in. and 10 G.	60 ft. per min.

For breaking down and intermediate reductions it is not advisable to run at more than 50 ft. per minute, and this is not often done, as with heavy work the shock upon the machine, when the load is suddenly taken up, is very excessive. For large shells above 4-in. diameter by ⅜ in. thick, 20 ft. per minute is a fair speed.

The reduction in the cross sectional area of the tube at each operation varies with the metal and the thickness of wall.

AMERICAN HARDWARE MANUFACTURERS' ASSOCIATION.

The executive committee of the American Hardware Manufacturers' Association on January 16, 1909, adopted the following resolution expressing the attitude of that body toward railroads:

WHEREAS, The largest consumer of hardware in the country, our railroad system, is at the present time maintaining purchases at the lowest possible volume; and

WHEREAS, The consequent idleness of many large industries supplying railroads has further curtailed to a drastic degree the amount of hardware normally required by those industries and for the construction of miscellaneous work, stores and dwellings; and

WHEREAS, A reassurance of investors as to further legislation affecting railroads will restore to the railroads their borrowing and purchasing power; therefore be it

RESOLVED, That the American Hardware Manufacturers' Association earnestly requests Congress and the State Legislatures to avoid further restrictions of railroads except such as are necessary for the protection of the public, and to investigate proposed measures of regulation with a view to ascertaining whether their form and scope are such as to effect the purposes designed without impairing the efficiency of operation, the wage scale or the earning capacity of the railroads.

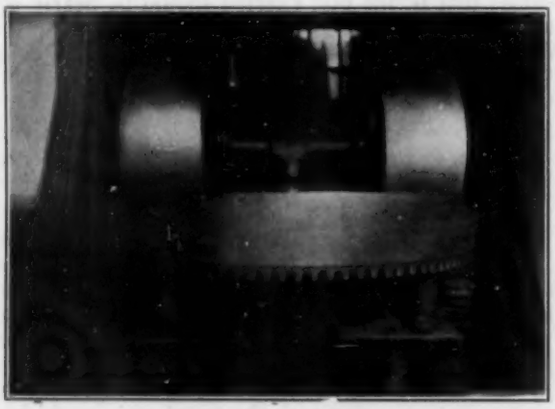
THE MINTING OF SILVER COINS.

By Hubert D. Coleman.*

(Concluded from January number.)

CRUCIBLES AND RECOVERY OF METAL.

The large crucibles No. 200 will average eight melts before showing evidences of a weakness or leak. It is not infrequent, however, for them to appear perfectly sound after the tenth melt, and if they last for twelve melts they are condemned and not used any more. Usually if they are found sound after the third melt they will in all probability last for ten heats. These crucibles are always carefully annealed by the melters before placing in the furnace, and every care exercised to prevent wedging of metal bars in the pot when charging. After a crucible is condemned it is thoroughly scraped inside and out, then broken into fragments and sent to the mill to be ground as sweeps. These broken crucibles, together with the clinkers and ashes from the melting furnaces, are all ground under heavy rollers and the resultant fine material sifted. All heavier particles are



SWEEP GRINDING MILL.

recovered as flattened pellets, and the fine granular dust forms the sweeps, which is assayed for gold and silver after being thoroughly mixed, and a number of samples tested. The account of the melter and refiner is credited with all gold and silver found in these sweeps. All recovered grains and pellets are melted into grain bars and assayed before being put into an ingot melt. If it is found upon assay that the fineness of these bars suggest that some base metal has been gathered and melted with these grains, it may be necessary to refine them, before using for ingot making. This is not usually the case and the silver grain bars after the assay is received are put into ingots.

It is often asked: how much metal do we lose in a year's operations? and when we say seldom as much as the mint regulations allow, 1½ ounces to the one thousand operated upon in silver and one ounce to the thousand on gold, every one seems surprised; but with all the care that we observe and credit given us for the metal found in our sweeps, there should not be anything like this, to us, seemingly great loss. After the ingots are made, and reported correct by the assayer, they are filed and trimmed and made ready for delivery to the coiner. A delivery to the coiner of ingots, and from him clippings to the melter and refiner takes place in presence of the superintendent's representative, who with the representatives of the coiner and melter and refiner weigh and witness the weight and record same, of all deliveries made either way.

*Melter and refiner, U. S. Mint, New Orleans, La.

"BREAKING DOWN" THE INGOT.

The first operation in the coining department is known as "breaking down" the ingots; this consists in gradually reducing the thickness of an ingot by rolling between two cast cylindrical rolls rotating in opposite directions. While this reduction in thickness goes on the ingot is lengthening until, when ready for the finishing rolls, it has elongated to about ten times its original length or more according to the denomination, and to facilitate handling is cut in halves. These ingots are worked cold, but of course soon become heated in being put through the rolls, and must be then handled with heavy gloves of buckskin. An interesting mechanism forms part of these rolls, by which the reduction in thickness of bars is made uniform for each lot rolled. It consists of what to all appearance is a clock, the hands of which being rotated by

STRIP ROLLING MACHINE.

a wheel crank, which also operates a worm gear bringing wedges into play which diminishes or increases the opening between the rolls. Each hour on this clock dial means a fixed reduction in the thickness of strips, a record of the hours being kept and each lot rolled accordingly.

PREPARING THE STRIP.

In order to reduce the ingot to a strip, the thickness of a half dollar, or any desired gauge, it is necessary to give it twenty or more passes on the "break down" and finishing rolls. It may seem strange to you to know that this ingot under the rolling process only elongates, the increase in width not being over an eighth of an inch. In determining the proper gauge, sample discs are cut from different portions of the strip and weighed. The micrometer caliper is also used, but determination of gauge by weight is preferred. Until recently it has been the practice to anneal strips, to facilitate both the rolling and punching operations; now the silver strips are not annealed at all, and a more uniform thickness is claimed.

PUNCHING THE "PLANCHETS."

When ready for the punching, called cutting, the strips are fed by a workman through a machine that cuts out the discs, leaving a strip of metal in the workman's hand called clipping and allowing the blank or planchet so called, to fall in a receptacle below.

These blanks, after being annealed, adjusted and picked over, are sent to the milling machine, where they are given an upset edge, by being made to rotate in a

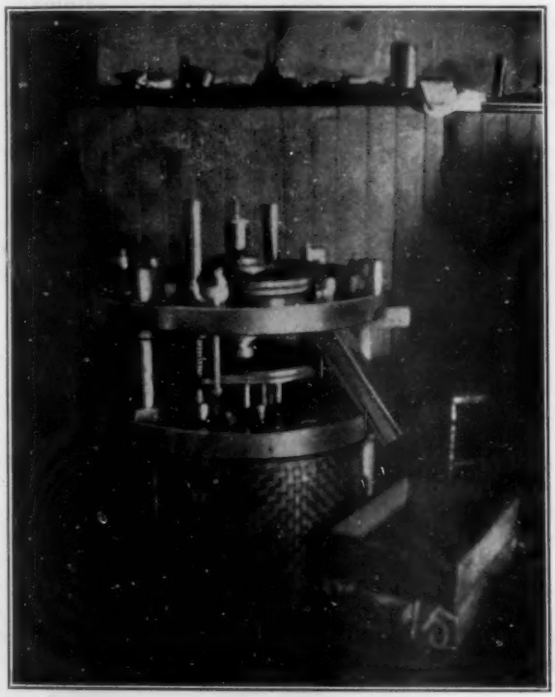
horizontal plane between a grooved segment and a rotating wheel similarly grooved. This upset edge serves to protect the face or impression when coin is resting on a plane surface.

ADJUSTING THE "PLANCHETS."

The adjusting of the blanks is done before the milling machine does its work, and surplus metal is filed from the rough edge left by the cutters. The limit of tolerance on all silver pieces is 1½ grains, the half-dollar piece to be of standard weight should weigh 192.90 grains. If when the adjuster first weighs it, the weight is found to be 194 grains, it is at once filed down to within a grain or so of 192.90. If the weight falls below 191.40 the pieces are condemned and returned to the melter and refiner for remelting. Dimes and quarters are not filed; if not found upon weighing each individual piece that they come within the limit they are condemned at once. The standard weight of a dime being 38.58 grains, it is of course easier to cut them standard, or within the 1½ grain limit or allowance.

STAMPING AND MILLING THE COIN.

After milling, the blanks are annealed and whitened, and are now ready for the presses. These powerful



MILLING MACHINE.

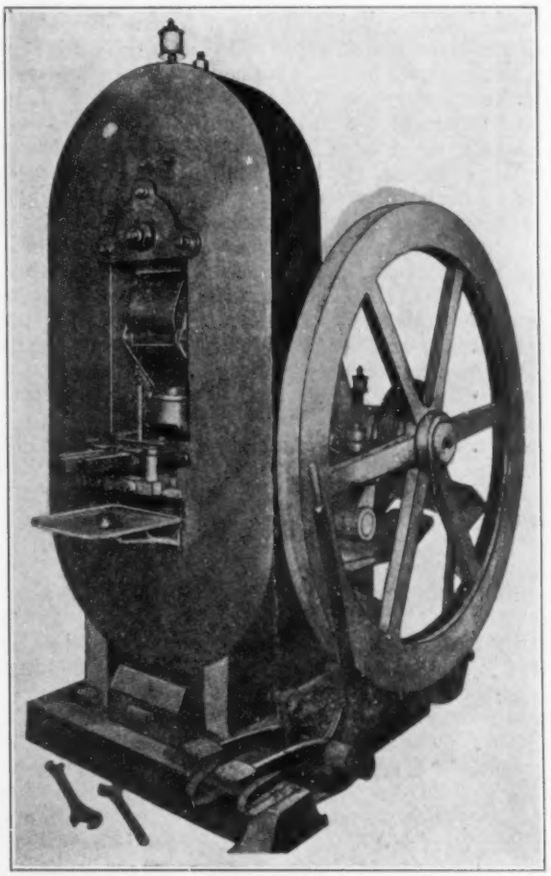
presses operate upon the toggle principle and exert pressures ranging from 175 tons to a double eagle, to 40 tons to a dime. A cylinder is kept filled with blanks, and as the dies approach, an automatic finger arrangement places the lowest coin in the cylinder, between the dies and in a collar. This collar is reeded or knurled and when the pressure of stamping both sides simultaneously is exerted, the metal of the coin is forced into the serrations of this enclosing collar and produces the knurled edge, which is also called milling. A final examination or reviewing is gone through with before the coins are made into deliveries of 1,000 dollars to a sack, and turned over to the superintendent to be stored.

WEIGHING THE COINS.

In order that the metal be properly kept track of, all lots are weighed before and after each and every operation, upon scales adjusted correctly to the 1-100 of an ounce. If a box of dimes is sent to the press room for stamping and one falls to the floor unnoticed, upon reweighing the balance needle will immediately show a rather quick deflection, for a dime weighs over eight times the minimum weight used on these balances.

THE DIES.

A word should be said about the dies, as they are really the most important equipment of an institution of this



COINING PRESS.

kind, and should a set be lost, the opportunity for an unscrupulous party to benefit cannot be overrated. Requisitions by the superintendent are made on the director of the mint, at the Bureau in Washington, D. C., for such working dies as may be required. All coinage dies are numbered consecutively and so stamped in the order in which they are prepared by the engraver. The obverse or date dies are destroyed at the end of each calendar year, by defacing, in the presence of the superintendent, coiner and assayer, and a certified list of dies so defaced is transmitted to the director. Reverse dies corresponding to the defaced obverse dies are returned without defacement to the superintendent of the mint at Philadelphia. The setting of these dies properly in the presses requires a nicety of adjustment, and only after long experience is proficiency gained on the part of a mechanic in this work.

The richest mines of manganese known are those of the Caucasus, in Russia. A committee formed is now considering a very important reduction in freight rates in order to increase the production.

PHOSPHOR BRONZE.*

Some Interesting Historical Details and Specifications.

By C. F. Gaywood.†

GENESIS.

The fact that phosphorus could be combined with copper has been known to chemists for many years. Phosphide of copper appears to have been first discovered about the middle of the 18th century by Macquer, and was afterwards studied by Bertrand Pelletier, who discovered a definite phosphide and Sage. In the chemical dictionary 1807, Aiken states that it may hereafter be found useful in manufacture. In 1865 Mr. Abel published some results he had obtained at Woolwich Arsenal on phosphorized copper (*Chemical News* vol. XII, page 172 and report of the British Association 1865) which were of a more definite and important nature than any previously obtained, but his compounds were confined to phosphorus and copper only. In the report of Captain Majendie on the Belgian experiments on phosphor bronze (1871, page 23), it is mentioned, however, that he addressed a special communication to the war department, dated 27th June, 1870, in which he stated that he had, subsequently to these experiments, made some with phosphorized bronze and the properties of the resulting mixture were of a promising nature.

As early as 1848-9, Mr. Parkes of Birmingham took out patents 12325 and 12537 for the employment of phosphorus in combination with copper and brass, but he does not mention bronze. In 1854-6 M. Roulz of the Orleans Railway had observed the great increase of tenacity and resistance to abrasion imparted to bronze by the addition of phosphorus. In June and July 1870 and March 1871, experiments were made by Montifiore, Levi and Kunzel at Liege on account of the Belgian Government on a much larger scale. These gentlemen were as early as 1867 making experiments and researches for the Russian Government in connection with the addition of various ingredients to bronze.

The experiments of Montifiore, Levi and Kunzel and those of the Belgian War Department were printed and lithographed originally for private circulation only at Brussels in 1870, in the form of a quarto volume with plates. From this we learn that as early as 1860, Messrs. Montifiore, Levi and Kunzel were engaged in experimenting on gun bronze and the result attending the addition of various ingredients thereto. In 1867-8 they carried out a long series of tests for the Russian Government in conjunction with Colonel Lavroff. These were not published but a large number of proof tests were made in connection with them by Mr. David Kirkaldy of Southwark, the results of which clearly demonstrated the superiority of phosphor-bronze. The experiments were carried out with additions of nickel, manganese and various other medicines, but the result of them all was to prove that phosphorus exerted the most powerful and beneficial effect. The first definite phosphide of copper was made probably by Pelletier. The employment of it commercially, and also of phosphorized brass, may be credited to Parkes, of Birmingham. The first definite experiments on the physical properties of phosphorized copper were published by Mr. Abel, and those on a phosphorized bronze by M. Roulz. The merit and completeness of the experiments of Messrs. Montifiore, Levi and Kunzel, however, and the definite manner in which the results obtained during their years of labor in this field of research surpassed so brilliantly anything which had before been achieved, justly entitles them to be regarded as the true pioneers of phosphor-bronze, a metal which has for nearly 37 years probably surpassed the expectation of its inventors, for it is perhaps the only metal which will do all that has ever been claimed for it, with a wide margin to spare, and which after this period, has a still increasing reputation.

The first patent for phosphor-bronze was taken out in France by Montifiore of Brussels in 1870, and had almost been allowed to lapse, when Mr. G. A. Dick, a friend of Dr. Kunzel, and an exile from Paris, called on Montifiore on his way to England, and asked him for assistance. Montifiore was a banker and appeared to think little of the financial value of the British patent, for he told Mr. Dick to go to London and pay the fees to save it from lapsing. He then, for a consideration, assigned the British patent to the late Mr. G. A. Dick, and the United States patent to that gentleman's brother. The former with the assistance of a number of influential English gentlemen, purchased the patent and founded in 1873 the first or pioneer Phosphor Bronze Co., Ltd., with whose successor of 1874, I am connected, and his brother, the late Mr. C. J. A. Dick, established the Phosphor Bronze Smelting Co. of Philadelphia. I think I have now said sufficient to demonstrate the fact that to Professor Kunzel belongs the chief honor of discovering and making available the valuable range of alloys known as phosphor-bronze, although it has naturally been the aim of my company to constantly improve the mixtures and the mechanical properties of these alloys, which partly on account of the increased purity of metals now obtainable, but also largely on account of the expenditure of thousands of pounds in equipment and experiments I venture to say we have done.

SPECIFICATIONS.

A good deal of confusion seems to exist even in the minds of some engineers as to the exact physical and mechanical properties of phosphor-bronze and the production throughout the country of so-called phosphor-bronze by small brass founders who have no knowledge of the scientific treatment of metals, has done much to still further shroud its identity and mislead consumers as to its properties. A bad phosphor-bronze is no better than a bad gun metal. In the hope that the information may assist not only Mr. Phillips, to whom we are all deeply indebted for his very able and valuable paper, but also others interested, I offer the following points for their consideration when framing specifications. True phosphor-bronze consists of pure copper, pure tin and pure phosphorus, any addition of other metals or impurities injuriously affect its properties, (except in some special cases of heavy bearings where phosphor-lead-bronzes are found of value). From these three ingredients a most marvelous range of alloys can be produced, varying greatly in their properties. These may, for the sake of convenience, be roughly divided into two classes.

1. Casting alloys, which include bearing metals with very little tensile strength and elongation, but great hardness and resistance to wear and abrasion to alloys giving strengths up to 17 to 20 tons with 20% elongation on 2 in. Between the two extremes are a series of combinations giving various strengths, elongation and other properties which render them suitable to meet different requirements as regards strength, hardness, etc., and size of casting. 2. Rolling alloys which embrace a fairly wide range of different mixtures, the properties of which can be still further varied by the amount of work put upon them.

*From a speech at January meeting Institute of Metals, London, Eng.

†Birmingham Manager, Phosphor Bronze Co., Ltd.

This class covers a series from a soft tough mixture which can be drawn into tubes and into wire so fine as to be woven into gauze, to a metal which is so hard and resilient as to be used for lock springs. When it is explained that even in springs the metal which gives sufficient resilience and most excellent results in the form of straight-lock springs is not suitable for bending against the grain as in switch springs, it will be at once apparent that the purpose for which the metal is to be used should, where possible, be stated. It would be well if those drawing up specifications for phosphor-bronze should either acquaint themselves with the various alloys and specify the mixture they considered most suitable or else stated upon the specification the particular purpose for which the metal was to be used and the treatment to which it was likely to be subjected, such as tension, shock, vibration, compression, friction, etc., for it is obvious that one mixture cannot equally suit each different purpose.

NEW WORKS OF THE ADAMS & WESTLAKE COMPANY.

By Frederick B. Fritz.

I had the pleasure recently of visiting what is considered to be the very highest type of brass foundry that has as yet been devised, that of The Adams & Westlake Company, Chicago. At least many people who have visited it say it is superior in many ways to anything they have ever seen. I was told that one of the government inspectors, who looked over this foundry, said he had never examined anything like it. This new foundry is on the top floor of one of the new buildings recently constructed by the company. The foundry is absolutely fireproof, the whole room, 100 x 100 feet, being built of concrete, steel and brick. The floors will easily stand 575 pounds to the square foot. The place is full of windows that extend from the floor to the roof, and in addition the roof has three saw-teeth skylights, which not only give an abundance of light, but also ventilation, as they can be manipulated so that the wind never blows on the workmen.

VIEW OF FOUNDRY, SHOWING FURNACES.

By far the greatest novelty of the foundry is the setting of the furnaces. These are exactly in the middle of the room. They are situated on both sides of a horizontal flue, into which the smoke and gases escape. From this flue two large stacks, each three feet in diameter, extend out through the roof, and each of these is capped with a large ventilator. Over all the furnaces and the horizontal flue are large hoods, at the top of which are four more large ventilators, these carrying off all fumes and gases. I have never seen a foundry where the ventilation was so good. The men said they were extremely comfortable there during the hottest days.

Every device for the easy handling of the work, including molding machines, power riddles, etc., have been installed. An interesting section is the pattern vaults. There are eight of these, one on each floor, each being 15.2 x 21.3 feet, and 13 feet high. Each pattern is so thoroughly marked as to where it belongs that it would seem impossible to make a mistake. In all these vaults contain 2,800 square feet of shelves.

Another especially good idea is the way the shop is rid of ashes. These are dumped into the mouth of a chute,

which discharges into a bin. When it is desired to empty the bin a wagon backs under it, a slide is opened, and the wagon is filled.

Another room, 100 x 125 feet, next to the foundry, can be used for a molding room, or as much as desired. In one corner of the room is the core room, with all the latest appliances for making and baking cores.

After going through the foundry I visited other parts of this immense plant, one of the largest brass working plants in America. On the brass finishing floor, in the middle of the room, are situated tiers of 2,280 bins, holding small castings, for it should be borne in mind that most of the work turned out by this company is small parts. These bins hold 124 tons, and all are tabulated so that everything has a place and everything is in its place whenever needed. The numbers and figures on the bins correspond with the numbers in their catalogue. Every conceivable machine for the working of brass is found on this floor, the one possibly needing particular mention being a battery of brass wire working machines, manufactured by the Cleveland Automatic Company, Cleveland. This floor is lighted by Nernst lamps.

In the polishing and buffing room each machine is equipped with a hood and piping, attached to a blower system installed by the Allington & Curtis Manufacturing Company, Saginaw, Mich., which carries the dust to the floor below and then to the upper floor in the foundry, where it can be used over again. This system does its work so well that there is no dust of any kind in the room.

The buildings are all equipped with a sprinkler system, as well as wide stairways, built in a large fireproof shaft, but these are rarely used, as there are immense elevators for the passage from floor to floor. The principal output of this immense plant is composed of railway supplies, car trimmings, signal lamps and lanterns, ship hardware, and brass beds.

The whole plant occupies a solid block, from Ohio to Ontario, and from Franklin to Orleans streets. There are seven buildings, all connecting, No. 1 being three stories; Nos. 2 and 3, four stories; No. 4, five stories; No. 5, six stories; Nos. 6 and 7, seven stories, all having basement underneath.

I am indebted to W. F. Stewart, the superintendent, for showing me around the plant. Mr. Stewart has been with the company for about fifteen years, the past seven serving as superintendent. The foundry is in charge of Heyman Krueger, who has been with the company for over thirty years.

The Adams & Westlake Company was chartered in 1867, with J. McGregor Adams as president. It was principally through the efforts and great ability of this gentleman that the business grew to its present immense proportions. He died in 1904, and the vice-president, Ward W. Willits, became president, and at the present time holds that position. Frederick T. Vaux is the vice-president and treasurer, and William S. Esteel, secretary.

VIEW OF FOUNDRY, SHOWING MOLDING FLOOR.

COPPER IN TURKEY.

Copper kettles, plates, pans, pots, etc., are indispensable in every Turkish household, not only in the poorest country hovel, but also in the tents of every nomadic tribe which wanders over the plains of Asia Minor. They are all hand made, and form one of the chief articles of sale in every bazaar in this country. Asia Minor is a land which is very rich in copper ore, and if modern methods of mining were used the output could be increased.

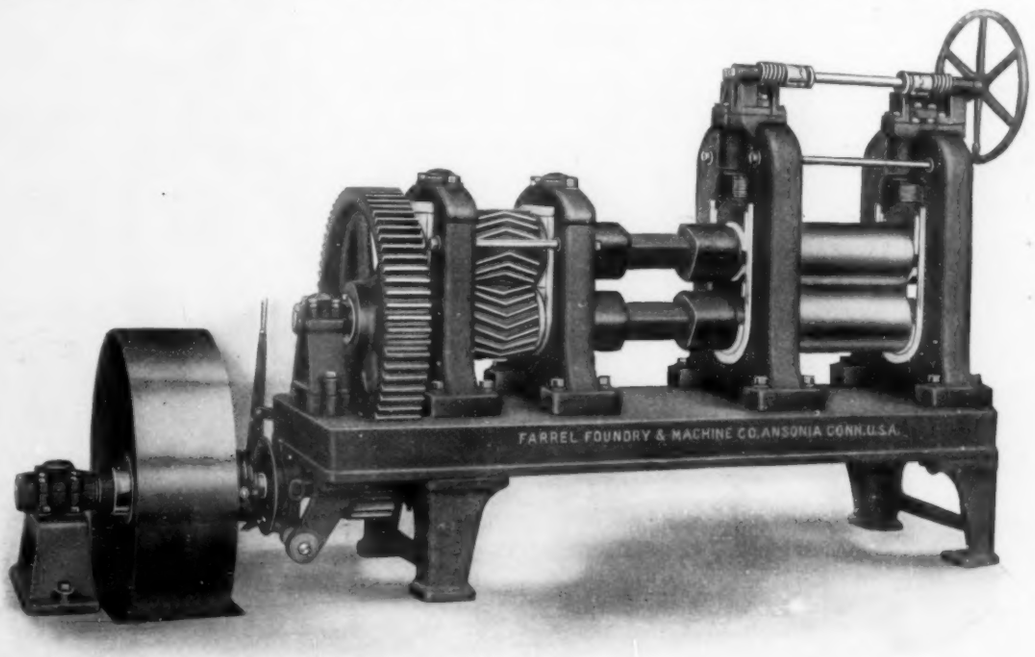
INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW 10" ROLLING MILL.

This illustration shows a modern type of small mill designed for rolling britannia, composition metal, gold, silver and the softer metals. The frames are set on a table in order to bring the rolls to a convenient height for the handling of the metal.

The rolls themselves are of best quality chilled iron, carefully ground on the faces, and driven by pinions mounted in independent stands. The drive is by means of a coil friction clutch pulley. This type of mill may be built with any diameter of rolls up to 12". Built by Farrel Foundry & Machine Company of Ansonia, Conn., who will be glad to furnish circular and full particulars upon application.



NEW 10" ROLLING MILL.

NEW POLISHING AND BUFFING LATHE.

The new lathe shown in cut is the result of constant inquiry on the part of manufacturers in trying to reduce cost by saving in space, power and labor. This is accomplished by the independent spindle which permits the continuous operation of at least one wheel. If the polisher at one end stops to change wheels, the other turns on. In many shops it is said that this will mean a saving of 50 hours per month per lathe. The lathe dispenses with countershafts, loose pulleys and incidental belting. It has only a single driving pulley and double friction cones securely housed in the lathe head. The forged steel clutches are operated by small hand levers above the casing. There is ample provision made for wear in the double friction cones; also in the spindle bearings, and a ready means for oiling. The size of the base is 90 x 32 inches, length of spindle 62 inches and weight 650 pounds. The lathe is built by the Hanson and Van Winkle Company, of Newark, N. J., who are willing to send one of the machines to any responsible company for thirty days' trial, to be returned if not satisfactory. The lathe can be seen in operation at their Newark or Chicago stores.

NEW POLISHING LATHE.

NEW MELTING FURNACE.

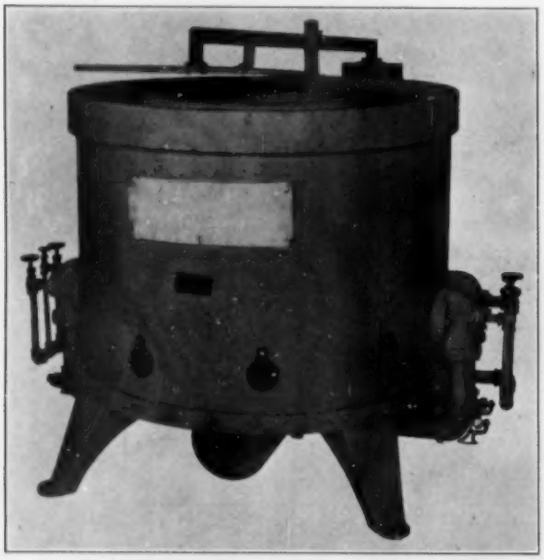
The furnace shown in cut is manufactured by the Strong, Carlisle & Hammond Company of Cleveland, Ohio, and is called The No. 22 Frankfort. Many superior advantages are claimed for this furnace—chief among them being uniformity of heating, owing to the construction of the combustion chamber.

The furnace is designed for use with either oil or gas as fuel. All live heat is utilized for heating the crucible, saving fuel and making a quick intense heat possible.

An adequate temperature is readily obtained with a minimum fuel consumption, making this the most economical furnace ever offered to the trade for aluminum and all kinds of soft metals.

SPECIFICATIONS.

Capacity 1,000 lbs. lead; 400 lbs. aluminum.
Floor space 44 ins. x 53 ins.
Height to top of pot, for gas, 33 ins.; for oil, 40 ins.



NEW MELTING FURNACE.

Equipped with large pot, 20 ins. wide at top, 18 ins. deep.
Equipped with small pot, 20 ins. wide at top, 12 ins. deep.
4 Weintz gas burners or 2 W. H. S. oil.
1 air tank.
1 positive blower, pressure 6 oz. to 1 lb. per square inch.
A counter-balance asbestos lined cover and a pyrometer, when desired.

SPECIAL AMMETERS, CHARTS AND CHEMICALS FOR COPPER, NICKEL AND SILVER PLATING.

The moment that a concern starts to eliminate guess work from its system, marks the turning point in its career. To aid in attaining this point the products manufactured by the Finkell Hachmeister Chemical Company of Pittsburg, Pa., will be found especially valuable. The charts issued in connection with their special ammeter will show the actual cost in plating goods, as it indicates the amount of metal deposited in a given time. By the use of these charts and ammeters the plater knows exactly what he is doing at any time during the progress of his work, and therefore can save thousands of dollars annually. This company also manufactures a line of pure chemicals, the value of which to the plater is too well known and understood to need any comment upon.

MODERN METHODS OF ELECTRO-PLATING.

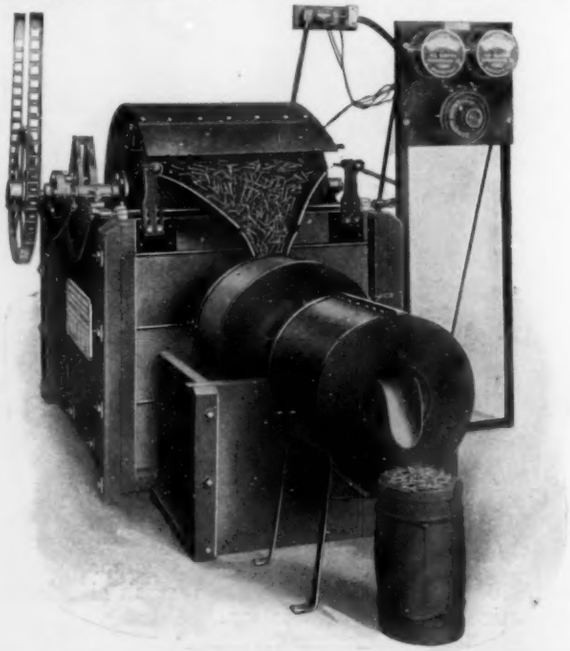
COPPER, ZINC, BRASS AND NICKEL.

One of the latest and most important improvements in this line of work, is the Patented Automatic Galvanizing and Plating Barrel, being manufactured and sold by the U. S. Electro Galvanizing Company, of 1-9 Park avenue, Brooklyn, N. Y., this concern being the pioneer of the patent process of electro-galvanizing, manufacturers and furnishers of nickel, brass and copper-plating plants equipped with patent handling devices, accomplishing a saving of from 50 to 75 per cent. on labor cost.

The plating barrel mentioned above is shown in the accompanying cuts and is operated in the following manner. The barrel is provided with a door on the cover through which the material is entered, an average filling consisting of

For galvanizing 100 to 200 lbs.
For other plating 50 to 125 lbs.

according to the nature and weight of material. When the barrel has been filled it is started revolving in what is known as the "galvanizing or plating direction." The time required is dependent on the kind of plating, nature of material and thickness of coating from 20 to 50 minutes. When the material is ready to be removed the motion of the barrel is reversed in what is known as the "emptying direction" by simply shifting a hand lever, whereupon it entirely automatically empties into the

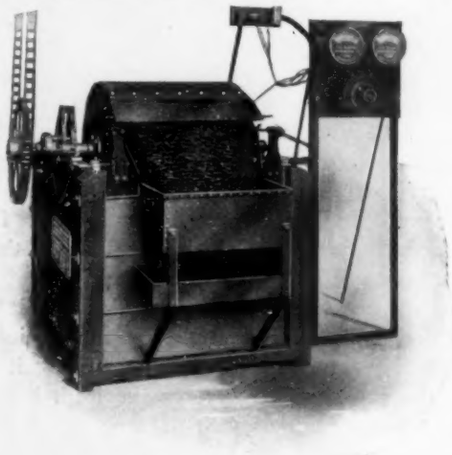


PROVIDED WITH PATENT APPARATUS FOR AUTOMATICALLY WASHING, DRYING, DELIVERING AND SEPARATING MATERIAL FROM SAWDUST.

washing receptacle or washing drum; when in the latter it remains here to be thoroughly washed, the water being kept clean by a continuous overflow and running water. The barrel is now again filled and started to move in the "galvanizing or plating direction," which at the same time reverses the motion of the washing drum; while the second lot of material is plating, the first lot is automatically removed into a draining drum and from there to a drying drum, thence to a keg or other receptacle. The whole operation is very simple, yet entirely automatic and above all practical. It is entirely impossible for it to get out of order because the combined apparatus is so

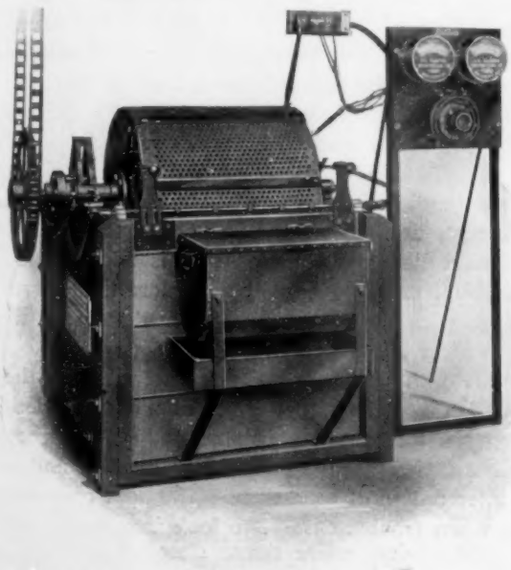
perfectly and simply designed it is surprising that this method was not lit upon many years ago.

Among its many advantages is the fact that it is so mechanically perfect that one man and a boy can attend to six of these galvanizing or plating barrels, consequently, although dependent somewhat on the nature of the material, from 4,000 to 10,000 lbs. can be treated in six barrels per day at a labor cost of about $3.00, absolutely no experienced labor being required. The galvanizing barrels are as a standard 36 ins. long, 40 ins. diameter; the plating barrel 25 ins. long, 24 ins. diameter; but larger or smaller ones can be made according to requirements.



VIEW WHILE EMPTYING.

Among the most important devices constructed and patented after years of practical experimenting and considerable expense by the U. S. Electro Galvanizing Company are the following:



VIEW WHILE PLATING.

(1) Patent Automatic Galvanizing and Plating Barrel.

(2) Patent Automatic Device for the treatment of long material, such as bar iron, pipes, etc., from one foot up to any required length.

(3) Patent Automatic Galvanizing and Plating Tank for sheet iron.

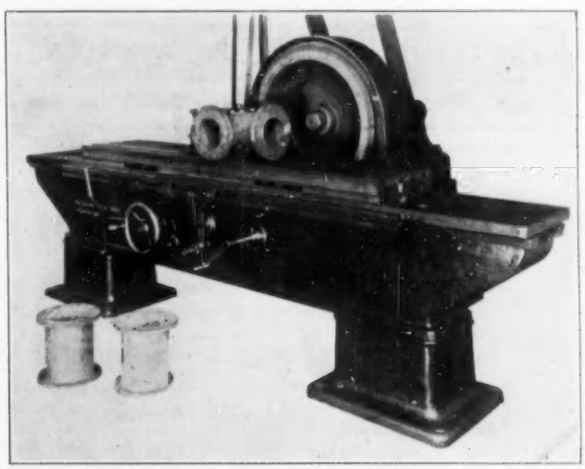
(4) Patent Automatic Moving Tank for handling miscellaneous material in large quantities.

(5) Patent Automatic Device for handling wire, chain, etc.

NEW GUIDE BAR AND GENERAL FACE GRINDER.

The Diamond Machine Company of Providence, R. I., has recently put on the market a large face grinder, shown in cut. It is for general shop use. Among the advantages of the machine, these may be mentioned: Its operation is not hindered by hard material of any kind. The work need not be so rigidly fastened as on a planer or milling machine. The mechanism movements are lively compared with those of other machines doing this class of work. The emery ring is held in a steel-bound adjustable chuck, as on machines of this nature the wheel should not run unsupported.

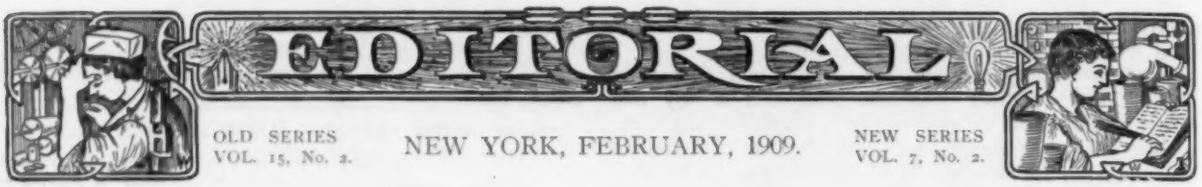
The bearings are ample, made with the best babbitt, ring oiling, and well protected from dust. The end thrust is taken by a ball thrust-bearing. Longitudinal table feed is obtained by open and cross belts which are connected to heavy gearing and a rack, with automatic reversing mechanism for any length of stroke, shifted by adjustable dogs. When hand feed is desired a clutch is thrown in mesh with a hand wheel. The cross feed is either automatic or by hand, as desired, and is capable of fine adjustment. An automatic pump with attachments is furnished for wet grinding on all machines.



A NEW FACE GRINDER.

These machines have been built in 84″ and 114″ lengths, for belt or motor drive. Longer machines can be made if desired. The following data apply to the 84″ machine:

Length of bed.....134″
Length of table 130″; width.....19½″
Length of platen (4 slots 13/16″ wide).....84″
Width of platen.....17½″
Table travel per min., lineal feet.....20
Total length including table travel.....18′ 4″
Total floor space required for operation.....18′ 4″ x 7′ 0″
Wheel 30″ diameter, in adjustable holder.
Wheel revolutions per minute, depending on work, 350 to 700.
Wheel spindle.....3½″
Wheel spindle bearing.....3½″ x 10″
Weight, all complete with countershaft, about 8,000 lbs.
Weight, with motor drive, about 10,000 lbs.



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THE CONSOLIDATION OF

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THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS' REVIEW
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NICKEL ANODES—TO CLEAN OR NOT TO CLEAN.

The discussion running in our Criticism and Comment columns for the past few months, on the subject of cleaning nickel anodes, has now reached a point where it is deemed advisable to pour a little oil on the troubled waters. The interest manifested has been widespread and a great deal has been said, both for and against. Out of the mass of information gleaned from years of experience and study, it should be possible to formulate some standard method by which a beginner in the plating business might be guided and benefited.

There are two sides to every question and it seems to us that now both parties have set forth sufficiently their most telling points. At the present writing it looks as though the anti-cleaners were in the lead, both numerically and in the force of their arguments. It is entirely possible that some of our friends are working a little in the dark, and perhaps a few words will serve to clear up the situation. One of the experts has a good deal to say regarding "conducting salts," and states that, "Frequently some conducting salt should be added to the solution to decrease the internal resistance." Another discourses upon the value of "corroding salts," claiming to have derived great benefits from the use of them. Both are right, for manifestly any substance that performs two offices can be called by the name of either.

The process whereby an anode is consumed in a nickel plating operation can be rightly termed "corrosion," it being pure and simple oxidation. Iron is corroded and rust is produced, the iron is oxidized. Lead is corroded by vinegar and white lead is formed, the lead is oxidized. The nickel anode is corroded and nickel sulphate is formed to enrich the solution, the nickel is oxidized. If a nickel solution does not conduct properly and some substance, called a conducting salt, is added to correct the trouble, it must necessarily also cause the "corrosion" or oxidation of the anode to be resumed. Hence we can with propriety call it a corroding salt.

The main and fundamental rule derived from the discussion seems to be: That a set of nickel anodes once working satisfactorily it is better to allow the process to be undisturbed rather than a frequent cleaning and consequent interruption of conditions. The next consideration is that when trouble ensues, to look into source of current, conductivity, connections, state of solution and, lastly, condition of anodes.

The question of cleaning, or not cleaning of nickel anodes and allied questions, can well be taken up for debate by the proposed platers' association now in process of formation. It is proposed to call it The American Electroplaters Association. We have already made reference to this in our Association and Society columns and THE METAL INDUSTRY stands ready to lend its aid in launching the new society.

EXPIRATION OF THE LAST OF THE ALUMINUM PATENTS.

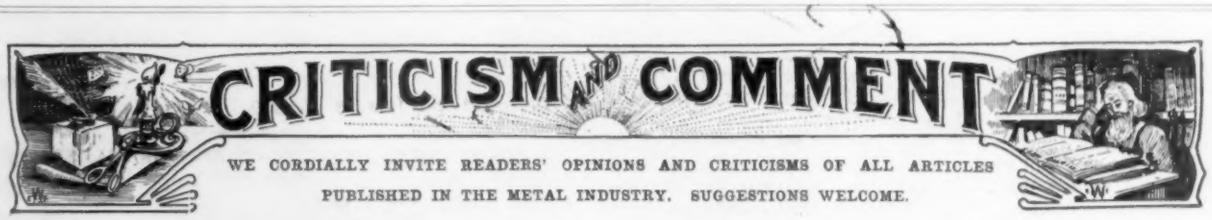
A recent event of importance to the metallurgical world was the expiration on February 2, 1909, of the Bradley patents, an invention relating to the manufacture of aluminum. These patents were owned by the Electric Smelting and Aluminum Company and were leased exclusively to the Aluminum Company of America to further protect the patent rights of that company in manufacturing aluminum. The Aluminum Company were the owners of the Hall patents for the manufacture of aluminum, which patents expired on April 2, 1906, but the company also used the Bradley patents. For further particulars on all of the aluminum patents we refer our readers to the April, 1906, number of THE METAL INDUSTRY, at which time we published a complete history of the subject.

The expiration of the Bradley patents now throws open to everyone the right to manufacture aluminum in the United States, there being in force no further patent rights on the successful process, but whether or not there will be active competition will depend, we believe, largely upon the market demand for aluminum. At the present time the single producer of this metal—The Aluminum Company of America—is able to manufacture sufficient aluminum to take care of the present consumption and has at its command ample facilities, such as hydro-electric power and supplies of raw material, to considerably increase their output. Pending, therefore, an abnormal increase in the consumption of the metal it is reasonable to presume that there will be no immediate competition. However, no one can accurately prophesy regarding future business action and it will be interesting to watch what development takes place in the aluminum industry.

STANDARD METHODS FOR BRASS ANALYSIS.

There is a movement on foot to have a committee appointed at the annual convention of American Brass Founders' Association to be held in Cincinnati next May, for the purpose of gathering information out of which standard methods for analysis of brass and kindred alloys may be compiled. This is a move in the right direction and would greatly benefit the brass industry. There are a great many questions that confront the brass chemist which are not covered by the existing literature, and free and open discussion, which will help clear up knotty points, is to be welcomed. The United States Government has its standard methods for the analysis of foods, etc. The steel industry has its prescribed methods more or less standard, so why not the brass industry? It is only within the last few years that brass foundries have begun to realize the all-important connection of science with their business. Time was, when the chemist and metallurgist in the foundry was looked upon with suspicion, but now his presence is beginning to be looked for as a necessary adjunct to the business. The adoption of a system of standard methods for analysis would go a long way towards lifting the brass business out of the darkness of mystery into the daylight of scientific explanation.

In relation to the criticism written by Experience published in our January number, and the answer thereto by Mr. Corse published in this number of THE METAL INDUSTRY, it might be remarked, that it was a little unfortunate that Mr. Hall's initial purpose as now explained by Mr. Corse was not so stated in the original article and was evidently not understood by our correspondent Experience.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES
PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

NEW BOOKS.

Practical Electro-Plating. A guide for the electroplater, giving complete instructions for the arrangement of the shop, the installation of the plant, polishing, plating, buffing, and lacquering. By W. L. D. Bedell. 5½ x 8 inches, 244 pages, 110 illustrations. The Hanson & Van Winkle Company, publishers. This is a book aimed to instruct the operator, in a practical manner, in the art of electroplating and metal finishing. The work illustrates and describes the necessary articles, states what they are used for, and how to use them.

The book, in arrangement and classification, differs entirely from any work previously published on the subject. It first describes the general shop arrangement, then, beginning with the installation of the dynamo, goes through the complete electrical equipment in the order in which it should be set up and connected, following with other necessary equipment and information in regular order. This will be found of particular advantage to the beginner.

Taking in the electro-deposition of the standard commercial metals, formulæ are given for making and operating various plating solutions. dips, and pickles, as well as the manner in which they should be maintained and renewed.

Book of Information. The annual circular of the Newark, N. J., Technical School. This school aims to give that knowledge and training to its students that shall make them capable men and women ready to meet successfully the practical questions of everyday life. The school offers courses in General Technical work; Jewelry and Silverware design; Building Construction; Electricity; Electroplating; Plumbing, and Machinery. All classes are open without charge to residents of Newark, N. J. Both sexes are admitted to the school.

Industrial Progress. 330 Clinton street, Milwaukee, Wis. This is one of the most interesting and valuable of the latter day "house organs." It is handsomely printed, contains fine illustrations and has 62 pages of well written descriptive matter. The book is published in the interests of the Allis-Chalmers Company, Milwaukee, Wis., and the text gives very interesting descriptions of the various installations made by this concern. The Allis-Chalmers Company are manufacturers of all kinds of power producing machinery, including electrical generators and gas engines.

COPPER PRODUCTION.

To the Editor of THE METAL INDUSTRY:

In your January issue, under the heading, "Uniform Price for Copper," you refer to the meetings being held by the producers of copper with the idea of collecting and publishing data relative to the production of copper. This statistical bureau has been formed and figures, we are told, will be published on February 10.

As a consumer of copper I would like very much to know why the producers have gone to all this unnecessary trouble. It seems hardly possible they are doing this from purely philanthropic motives; the copper market to-day is so closely identified with the stock market and Amalgamated Copper Company stock that any information given out by the leading selling agents seems to have a Wall Street flavor to it, and the "information" is accepted and treated accordingly; hence statistics given out by interested Wall street operators may possible fail to carry the weight they should. Why are these domestic statistics not published by a strictly unbiased authority like the Secretary of the Metal Exchange? These figures were compiled very carefully and published monthly some seven or eight years ago, but they were discontinued apparently by order of the powers that be. Why they were ordered stopped no one really knows.

The New York Metal Exchange publishes statistics in pig tin every month that stand as the basis in the New York market, and copper figures published by this same authority would certainly command the respect of every consumer of copper in this country and abroad.

CONSUMER.

New York, February 10, 1909.

CLEANING NICKEL ANODES, WEIGHING THE NICKEL.

To the Editor of THE METAL INDUSTRY:

There is a fundamental law regarding the rate at which a deposit of any metal may be obtained from a solution, and as the communications under "Criticisms and Comments," by Mr. Percy Brown are at variance with this law that was discovered by Faraday, I believe that your subscribers are liable to be led into serious errors, if a correction of his statements is not forthcoming.

Before quoting this law and illustrating its working, I request permission to reply to the accusation of Mr. Brown that I made an "absolute misstatement" of his figures when he wrote "Grs" and I read it grains, and which he now says stands for Grams. According to all authorities, his abbreviation was incorrect, and my authority for reading it grains was G. L. Boney ("Electro Platers' hand book, page 173, also Descriptive Chemistry, by Mr. L. C. Newell, page 438"), who says the preferable abbreviation for gram is "Gm." It will be apparent to everybody that the additional data furnished by him necessitates a revision of my figures, which I will undertake to do, as I proceed to show, as I said before, how to ascertain the amount of nickel deposited by a known current for a specified time. The specific gravity of nickel is 8.6 (Doctor Langbein's book, page 394), and the weight of nickel decomposed by 1 ampere in 1 hour is 1.1062 grams (by the same authority), which figures I will use to show how they disprove the results obtained by Mr. Brown.

In November he asks if I know that my nickel deposit on steel .001 inch thick would weigh about .0800 grams per square inch? I confess I do not, for this reason—the volume of 1 cubic inch of water = 16.387 cubic centimeters (Descriptive Chemistry, by L. C. Newell, page 438), then .001 of this volume = .016387 cubic centimeter, which, multiplied by the specific gravity of nickel 8.6, = 0.1409282 gram, and not .0800 gram, as claimed by Mr. Brown. Again, in the same article, he states positively that a deposit .00020 inch thick on brass would weigh on an average .0169 gram per square inch; this also can be readily shown to be absolutely wrong by the above figures, for if a deposit .001 inch thick weighs 0.1409282 gram, then a deposit .00020 inch thick would weigh .028184 gram, how he makes it .0169 I cannot explain and hope he can.

He claims a deposit of .0169 gram per square inch with 1.5 amperes of current per square foot of cathode surface in one hour, and I find from the table referred to above that 1 ampere decomposes in one hour 1.1062 grams of nickel, then 1.5 amperes must decompose 1.6593 grams per hour, the amount he should have deposited on 1 square foot, which equals on one 144th (or one square inch) .01152 gram, not .0169, and either he has made a mistake or he must have discovered a new specific gravity of nickel, which, if so, is sure to cause widespread attention among chemists through the entire world.

Now, in his January article, he says he deposited in one hour with 3.36 amperes per square foot of cathode surface 4.08 grams; well, if 1 ampere deposits 1.1062 grams, then 3.36 amperes should have deposited 3.716832 grams in one hour, and here again we await his new process anxiously. Lastly, in the same article, he claims to have deposited in one hour with 4.78 amperes per square foot of cathode surface, 6.019 grams, and by applying the same rule, we find his deposit should have weighed 5.287636 grams, which is quite remarkable.

In the above examples I have endeavored to show that 1 ampere always decomposes exactly the same amount of any given metal, in a given time, and knowing this amount, we can, by multiplying it by the number of amperes used, know exactly the weight of a deposit; also that knowing the specific gravity of a metal deposited, and the thickness of the deposit, on a given surface, the weight of the deposit is easily determined, and I ask Mr. Brown for the benefit of those whom his previous articles have misled, to endorse this statement. B. W. GILCHRIST.

Woodhaven, January 27, 1909.

STANDARD METHODS FOR BRASS ANALYSIS.

To the Editor of THE METAL INDUSTRY:

I have read with a great deal of interest the criticisms in the January number on Mr. Hall's article, which appeared in the Electro-Chemical and Metallurgical Industry. I would say that as I suggested to Mr. Hall, the compiling of these methods, I feel a certain amount of responsibility for them, and think that the writer of the criticisms could have accomplished what he desired without being quite so outspoken in some of his comments. One of the main objects in compiling these methods was to draw out intelligent criticism with the end in view all the time of gathering together accurate information regarding standard methods of brass analysis. I feel that if we can get a committee appointed at the Convention of the American Brass Founders' Association to undertake this sort of work, we shall have taken a long step forward in accomplishing what the Association stands for, so that I shall appreciate your calling attention in your editorial columns to the fact that any attempt to compile methods for brass analysis, however imperfect, is made, or should be made, with the intention of finally getting from the mass of information presented a workable scheme, which the ordinary metallurgical chemist can use with a fair degree of certainty.

WM. M. CORSE.

Detroit, Mich., January 25, 1909.

GOVERNMENT SPECIFICATIONS FOR MANGANESE BRONZE.

To the Editor of THE METAL INDUSTRY:

The bureau wishes to thank you for your courtesy in transmitting to the bureau the January, 1909, number of your publication, inviting attention to the article by Mr. Jesse L. Jones, as to the Government specifications for manganese bronze. It appears that Mr. Jones' criticism pertains to the specifications for the Bureau of Ordnance and the bureau will be pleased to refer said article to that bureau, with the suggestion to the effect that the present specifications should be amended, if it is at all practicable to do so. The manganese bronze for that bureau is used almost entirely in the manufacture of gun equipment at the naval gun factory, of the Washington yard, and the question of issuing a standard specification for their bronze has been under consideration during the last month.

Manganese bronze is purchased for other yards and stations, except for Washington, in very considerable quantities and the bureau believes that the specifications for bronze for those stations meet with the approval of the manufacturers, because no criticism of them has been received. In the case of the gun factory work, however, it is special in every particular, and stringent specifications should be followed.

Navy Department, Bureau of Supplies and Accounts,
Washington, D. C., February 1, 1909.
By direction of the Paymaster-General,
E. T. PEOPLES.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—Can you tell us the best method of introducing a small percentage, say, 1 or 4 of copper, into tin and lead alloys?

A.—The best means of introducing small amounts of copper into tin and lead alloys is by means of an intermediate alloy or hardener composed of tin 80 parts, copper 20 parts. If the alloy is to consist of lead, antimony and a small amount of copper, but no tin; the copper may be added by means of a hardener composed of copper 50 parts, antimony 50 parts.—J. L. J.

ANALYSIS

Q.—Will you kindly advise us of the analysis of German silver?

A.—A sample of 18% German silver sheet from one of the best makers in the United States had the following analysis:

Copper	56.410%
Nickel	17.245%
Zinc	26.045%
Iron	trace
Lead	trace

The percentage of nickel in German siver may run from 5 to 30%. When the alloy is to be used for sand castings, small amounts of manganese and aluminum are usually added.—J. L. J.

BRAZING

Q.—Will you please publish a receipt for a brazing solder suitable for using on sheet German silver?

A.—A solder that has the melting point of silver solder—that can be rolled into sheet and is cheap, would be welcomed by a great many manufacturers. Unfortunately, there is no such article. The following mixture is not far from silver solder in melting point, but it is too brittle to be rolled:

Copper	40
Zinc	40
Tin	20

This solder is used to some extent by manufacturers of electrical apparatus for soldering German silver strap to copper strap. —J. L. J.

CASTING

Q.—For casting the body and caps for oil cups, we have trouble with the castings being spongy and porous. They are cast of red brass, and we use good material.

A.—If you use good material and have a good molder who gates his castings properly and gets his sand of the right temper, it is very likely that your defective castings are due to allowing the metal to soak in the fire and become oxidized and sluggish. You will find that if you can pour metal as soon as it is ready, it will run better, can be poured at a lower heat, and will be less likely to give spongy castings than when it is allowed to remain in the fire waiting until the molds are ready.—J. L. J.

CLEANING

Q.—Will you kindly furnish us with formula for an electro-chemical cleaning bath for iron?

A.—If wanted for removing incidental scale and rust on iron or steel stampings, etc., use any of the electrolytic cleaning formulas. If wanted to remove the heavy silica scales of iron castings, a sand blast will be found more advantageous than any electro-chemical process. There have been several electro-chemical processes adopted for this purpose, but usually they fail to continuously meet all requirements, as the varying nature of the work and the volume and character of current at command has much to do with the results. If you desire to produce a chemically clean surface for subsequent coating electrolytically, try a solution of ammonium sulphate, about ¾ lbs. per gal. of water; use the work as an anode until scale appears loosened, then reverse the current, using all available until the loosened scale has been removed.—W. L. C.

COLORING

Q.—I am trying to find some way to produce on a sheet of metal 70 per cent. nickel and 30 per cent. copper; the greenish tint that one often sees on old bronze, and it occurs to me perhaps you could help me out?

A.—It is impossible to produce a patina upon German silver on account of its slight oxidization. The green color is due to the formation of carbonate of copper resulting from the action of the carbonic acid in the atmosphere and in the natural oxidization of the metal itself. The only method to pursue to obtain the results desired would be to copper plate the alloy or imitate the effect by the pigment method. The method we can supply you with.—C. H. P.

DIPPING

Q.—Can you recommend an acid or copper dip that will make fairly good brass castings look like red metal?

A.—To color brass castings a reddish color, proceed as follows: Dissolve in each gallon of warm water 4 ozs. of sulphate of copper and then add 2 ozs. of oil of vitriol. A bath sufficiently large for your purpose should be prepared. A wooden tank lined with ⅛ sheet lead or earthenware glazed acid pot can be used. The articles should be fairly clean. To color, immerse in the solution for a few minutes by the aid of heavy woven iron wire baskets or the articles may be strung on soft iron wire. The iron reduces the copper from the solution and in contact with with the brass causes a redeposit. This gives a light copper color to the castings and is termed coppering by immersion. The bath should be used at a temperature of 15 degrees, although a slight variation in either direction produce equally as good results.—C. H. P.

FINISHING

Q.—I would like to have you publish a formula for producing Tiffany green finish on bars.

A.—The formula for producing Tiffany Green is composed as follows:

Water	1	gal.
Sulphate of copper	8	ozs.
Sal ammoniac	12	"
Common salt	4	"
Acetic acid	1½	"
Chloride of zinc	1	"
Glycerine	1	"

The method of using is to immerse the article in the solution or with a painter sash tool stipple the solution on the surface of the metal. To use the formula upon brass, first prepare a solution consisting of ½ lb. of sulphate of copper and ½ lb. sal ammoniac in one gallon of hot water. Immerse the cleansed article in this solution, and a dark oxidized surface will result. Allow to dry in the air, then apply the Tiffany Green by immersion or stippling. Allow to dry for some time, if possible in contact with a little steam in a closed chamber, afterwards allow to dry in the open air. If the green is not sufficiently dense, pass rapidly through clear cold water and again allow to dry, afterwards lacquer with a transparent dip lacquer, and when dry, brush with beeswax and a soft dentists' hand brush.

For dark verde effects, the articles should be copper plated, then oxidized in a cold liver of sulphur solution in the proportion of ½ oz. to each gallon of water. In this case omit the sulphate of copper and sal ammoniac, and use only the Tiffany Green, as directed, but, of course, washing the articles after oxidizing.—C. H. P.

GALVANIZING

Q.—Please publish formula for the best process of electroplating cast iron and steel with zinc.

A.—The formula that gives the best satisfaction in electro galvanizing consists of:

Water	1	gal.
Sulphate of zinc	2	lbs.
Sulphate of aluminum	1	oz.
Yellow dextrine	½	"

To prepare the solution, dissolve the sulphate of zinc in warm water; then add the other ingredients. Use anodes of cast zinc, and when the bath is first prepared, allow the anodes to hang in the bath about 5 hours before the solution is used. The slight action of the solution neutralizes the free acid. The cast iron is freed from sand by using the hydrofluoric acid dip, afterwards immersed in potash, and scratch brushed, then immersed in a dilute solution of muriatic acid washed and passed through a weak sulphate of copper dip; this gives a slight copper tone and consists of:

Water	1	gal.
Sulphate of copper	2	ozs.
Oil of vitriol	1	oz.

Wash and place directly in the galvanizing bath. The current should not be less than 6 volts, and at least 20 amperes for each square foot of surface. The duration of the deposits from 15 minutes to 1 hour. A strong current produces a spongy deposit, a weak current a darkish one. For brightening zinc deposits use steel scratch brushes and brush dry.

2.—A good tinning solution for iron or steel can be made by dissolving 6 ozs. cream of tartar and 1 oz. chloride of tin in each gallon of water. Use anodes of pure tin and a medium current.—C. H. P.

LACQUERING

Q.—We send you a short piece of brass-covered, iron-lined, lock-joint tubing. We are very anxious to find out what causes the lacquered surface to discolor and show streaks.

A.—We have made a number of experiments on the section of tubing sent us, and are of the opinion that the direct cause of the discoloration and streaks produced is due to the fact that an unusually high temperature is used in drying, after lacquering, when not more than 100 or 120 degrees should be used for this purpose. The amyl acetate solvent used in connection with nearly all lacquers has a tendency to produce coppery discolorations when used upon brass, more especially in connection with iron. The discolorations were easily removed by a light cut with tripoli on the regular buff wheel, leaving the brass perfectly clean, showing it was not due to any action of the iron on the brass, but a chemical action caused by the lacquer solvent, and too high a temperature.—C. H. P.

MIXING

Q.—Can you let me know through your paper the composition of the bearing or babbitt metals in most common use, also where to get the copper hardening strips for such alloys?

A.—There are hundreds of different mixtures for babbitt metal, but the average manufacturer will find two grades sufficient for his work. For high grade work use Government Standard Babbitt which consists of tin, 88.8%; antimony, 7.5%; and copper, 3.7%. For general work there is no better babbitt than what is known as "P. R. R. No. 1," which consists of lead, 83⅓%; tin, 8⅓%, and antimony, 8⅓%.

You can obtain hardening strips from any manufacturer of babbitt metals. By melting your tin or lead in an iron kettle and adding these hardening strips you can make your own habbitt.—J. L. J.

Q.—Can you give us a good formula for hardware castings and also tell us how to figure cost of same?

A.—A high grade mixture for casting hardwares is the following:

Copper	90
Tin	7
Zinc	2
Lead	1

You can calculate the cost of this mixture from the market prices of copper, tin, zinc and lead. By adding from 4 to 6c. per pound to the cost of the metal, you can obtain the cost of the castings.—J. L. J.

PLATING

Q.—What is the cause of silver anodes turning black when they are in action?

A.—It is very hard to determine what is the direct cause of black silver anodes; there is one thing certain, it is due to impurities in the silver, probably the peroxide of silver. One peculiarity of black silver anodes is that there is more complaint about black anodes in the late fall and winter time than in summer. This is probably due to the bath being somewhat warmer, and the peroxide formed is more soluble in a temperature of 80 degrees or more, than one below 70. Some platers think the formation proves that the bath is in good working condition when the peroxide forms while plating, and is dissolved as soon as the action of the current ceases; but this is a matter of opinion. Silver anodes can be purchased that will not turn black, and are guaranteed by the producers.—C. H. P.

Q.—Can you give us a formula for the most practical way to metallize and plate bone handles on knives and forks?

A.—Probably the quickest and surest way for you to pursue would be to coat them first with a turpentine copal varnish; let this be applied as thinly as possible. While tacky rub in copper bronze powder thoroughly, and then allow to become hard. Connect up your knives and immerse quickly in a dilute cyanide of mercury solution, then strike in a silver solution containing very little free cyanide. After a film of silver is obtained, place in the regular silver bath until a sufficient deposit is obtained. It is advisable to have the solution in motion so that a smooth deposit may be obtained. It may be necessary to scratch brush the handles once or twice during the plating operation.—C. H. P.

REFINING

Q.—How are sweepings from the floor and matter from the polishing rooms refined?

A.—Sweepings are usually burnt in a furnace made for the purpose, then the residue is placed in a graphite crucible and melted, using a flux consisting of a mixture of:

Soda ash	8	ozs.
Borax glass	2	"
Sand	1	"
Fluor spar	½	"

The ingredients are thoroughly mixed when melting; 1 part of flux is used for two parts of the residue; when fusion is complete the remaining silver is poured into ingots or poured into water to obtain granulated silver.—C. H. P.

SILVERING

Q.—Please publish a formula for resilvering mirrors, and how to apply it.

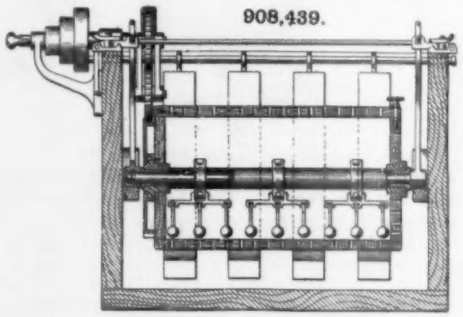
A.—In resilvering mirrors it is necessary to have the surface chemically clean; this is accomplished by removing the backing and the old silver, cleansing with soda solution, immersing in a 5 per cent. solution of nitric acid, and then immersing in clean water until ready for use. The silvering solution consists first of 8 ozs. of distilled water brought to a boil; then add 12 grams of nitrate of silver and 12 grams of rochelle salts; let the solution come to a boil for 5 or 10 minutes, then cool and filter.

Solution No. 2 is made as follows: Take 8 ozs. of distilled water, and into a small quantity poured into a tumbler, put 19 grams of nitrate of silver, stir well until dissolved, then add several drops of 26% ammonia water until the solution becomes clear; add 16 grams more of nitrate of silver, stirring well until dissolved; add the balance of distilled water and filter. The filtering must be done through a glass funnel in which the filter is placed. The solution should be well stirred with a glass rod; keep the solutions in separate bottles marked No. 1 and No. 2. Cleanse the glass as directed, then mix half and half of the two solutions, stirring them well, and then lay the glass flat and pour sufficient in the center to just flow completely over the glass. Wait until the silver is all precipitated; then drain off, wash carefully and dry. The backing consists of asphaltum varnish thinned with benzine; flow over the silvered surface; when dry a second coat may be painted on with a soft brush.—C. H. P.

PATENTS

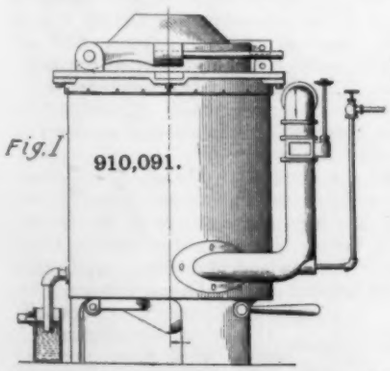
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

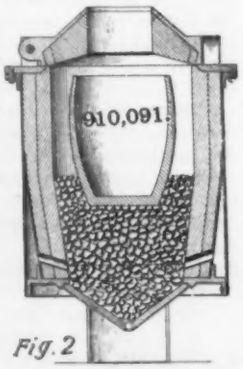
908,439. January 5, 1909. Electroplating Apparatus. Clarence G. Backus, New York, assignor to Zucker and Levett and Loeb Company, New York. An electroplating tank, convenient in operation, simple in construction, and in which the electro-



plating cylinder or drum can easily be inserted in or removed from the tank. The drum is so arranged as to provide a good electrical contact with the articles being plated without the aid of wires or other conducting devices, and furthermore the electroplating fluid at all times has free and full access to the articles being plated. The cut shows the general construction of the device.

910,091. January 19, 1909. Gas Generating Crucible Furnace. Edward H. Schwartz, Chicago, Ill. Assignor to Kroeschell Brothers Company, Chicago, Ill. A crucible furnace designed to meet the most improved requirements for convenient and economical melting of metals. This furnace, as will be seen by reference to the cuts here produced, is provided with means for producing gas by means of steam or air, introduced into the combustion chamber by layer pipes, (Cut 1). The gas is then consumed, thereby securing full efficiency from the fuel. The

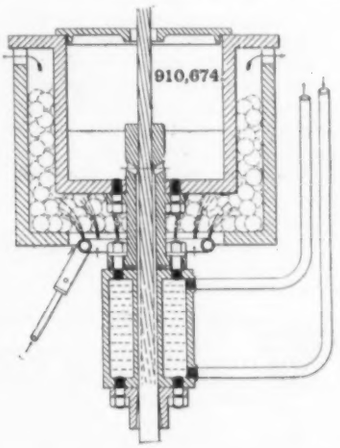




peculiar construction of the bottom, (Cut 2) causes the fuel to pack closely and insures the lasting of same long enough to produce fusion in the crucible. This is a great advantage, as the furnace top need not be opened until fusion is complete and the metal ready for pouring. Other advantages, are a water seal to prevent escape of unconsumed gases, and a lining in two parts so that only the inner and cheaper one need be replaced from time to time.

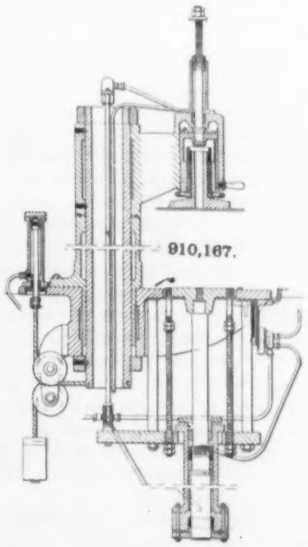
909,869. January 19, 1909. Metal Coating. Guilliam H. Clamer, Philadelphia, Penn. An invention to provide a metal, as iron, etc., with a coating of zinc, and an exterior coat of lead, both coatings free from pin holes, and protecting the sheet from corrosive action. The patent covers the process of treating metal as iron, which consists in coating it with zinc, and afterward with lead containing zinc up to the saturation point, and tin not to exceed 4 per cent. by weight.

910,674. January 26, 1909. Method of Protecting Metallic Wires Against Oxidation and the Like. William Hancock, Clifton, England. A method of applying to the wire, e. g., a stranded iron wire, a protective coating of lead or other non-rusting metal which is caused not only to form a sheathing



around and outside the iron wire cable, but also to enter the cable and surround the separate strands. The cable is drawn by suitable means, as shown in cut, through a molten lead bath. The cable may be to advantage tinned and treated with a flux before being coated with lead.

910,167. January 19, 1909. Molding Machine. Philibert Bonvillian and Eugene Ronceray, Paris, France, assignors to The E. H. Mumford Company, Philadelphia, Pa. A molding machine that is particularly adapted to the formation of deep molds



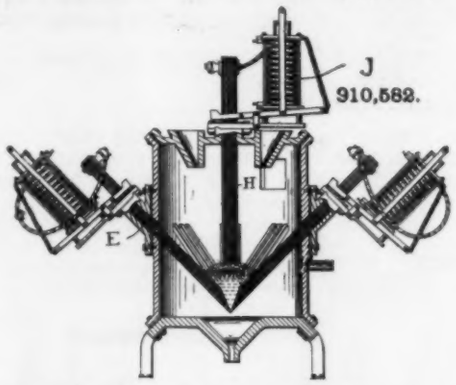
having portions of greatly varying depth. A uniform compacting of the sand in all parts of the machine is secured. The machine is also provided with improved and simplified stop mechanism for regulating the movement of the operating mechanism. The features of this will be seen by referring to the cut.

909,666. January 12, 1909. Process of Obtaining Nickel from Silicious Ores. Edgar F. Price, Niagara Falls, N. Y., assignor to Central Trust Company, New York. A silicious ore

of nickel and iron is smelted in an electric arc furnace. Carbon being added in sufficient quantity not only to effect the reduction of the iron and nickel, but also to protect the electrodes from oxidization. The pure nickel is then treated when molten with air, and an acid flux, preferably silica, to remove the iron as a slag. This latter process may be performed in the reducing furnace itself or may be done in a separate converter.

910,564. January 26, 1909. Process of Producing Compound Metal Bodies. John F. Monnot, New York, N. Y., assignor to Duplex Metals Company, New York. A method whereby compound metal bodies can be produced by welding together unlike metals such as iron and copper, iron and silver, etc. A sheet or layer of one of the metals, preferably the one with the lower melting point, is placed in a mold, and then pour into the mold the other metal, causing the molten metal to solidify against the surface of the first metal and unite with it. The secret of this process lies in the preparation of the metal treated. This is done by cleaning the surfaces thoroughly and coating with a film of fusible deoxidizing material such as aluminum, magnesium or cadmium, and further to perform the operation in an atmosphere of producer gas or some other reducing agent.

910,582. January 26, 1909. Electric Furnace. James H. Reid, Newark, N. J. An electric furnace (see cut) that is provided with a vertical electrode, H, which extends through the top, and has an automatic constant current regulator, J, connected to it. It will thus be seen that in operation the amount



of current flowing through each of the different phases may be regulated, and the neutral point, being in the centre of the charge, insures a uniform heat throughout the same. The current used is polyphase, and the crucible is formed by a plurality of electrodes as shown.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, Charles J. Caley, New Britain, Conn.; Treasurer, John H. Sheeler, Philadelphia, Pa.; Secretary, W. M. Corse, Detroit, Mich. All correspondence should be addressed to the Secretary, W. M. Corse, 123 Palmer Avenue, East, Detroit, Mich. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association the latter part of May each year in succession of cities, as invited. The 1909 Convention will be held in Cincinnati, Ohio, May 18-20.

Announcement.

Secretary Corse has issued the following announcement:

The coming convention of our association will be held in Cincinnati during the week of May 17, 1909, in connection with the American Foundrymen's Association. Our own meeting days will be on the 18th, 19th and 20th, while the great exhibition of working foundry machinery and equipment prepared by the Foundry and Manufacturers' Supply Association will be open during the entire week. Hotel Sinton has been selected as headquarters, rates, etc., to follow in a subsequent announcement. Cincinnati extends a very hearty welcome to us, and arrangements are being made to give us a most enjoyable week. Your secretary asks that those foundrymen who have had abundant leisure during the hard times to study up new methods of economy and shop procedure, give us papers and subjects for discussion at the coming gathering, so that with the renewal of business activity we may use our resources to better advantage. A mere memorandum embodying the idea will be highly acceptable, and capable speakers will be found to go into the subject so that it may be thoroughly discussed.

P. S.—Kindly note that the secretary's address is now No. 123 Palmer avenue, E., Detroit, Mich.

A new member of the Association is the Bay State Brass Company, 150 Nassau street, New York.

INSTITUTE OF METALS.

President, Sir William White; Treasurer, Professor Turner; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretary, G. Shaw Scott, M. Sc., Institute of Metals, Caxton House, Westminster, S. W., London, England, The objects of the Institute are for the educational welfare of the metal industry.

Interesting Discussions in London.

The second meeting of the Institute of Metals inaugurated at Birmingham in November, was held at the Institute of Mechanical Engineers, Westminster, London, England, January 19 and 20. The series of papers given in Birmingham were deferred for discussion in London, but in the meantime Sir Gerard Muntz, of Birmingham, had written a paper on "The Relation Between Science and Practice and Its Bearing on the Utility of the Institute of Metals." Sir Gerard was unfortunately prevented from attendance by the death of his father, Sir Philip A. Muntz, and the president, Sir William White, voiced the acknowledgments of the conference to Sir Gerard for his paper.

The president announced the election of officers, as the result of a ballot vote taken by members throughout the country. His own election as president had been confirmed, with the following vice-presidents: H. D. Bonner, London; H. Cookson, Newcastle-on-Tyne; Professor W. Gowland, London; Sir Gerard Muntz, Birmingham; Vice-Admiral H. J. Oram, London; Sir Henry A. Wiggin, Bart, Birmingham. Members of Council: G. A. Boeddicker, Birmingham; J. A. Bayliss, Birmingham; J. Corfield, Swansea; Dr. F. Elgar, London; R. K. Gray, London; J. T. Milton, London; E. Mills, Swansea; Prof. T. K. Huntington, London; G. N. Nisbett, Prescot; E. Ristori, London; A. E. Seaton, Birmingham; C. H. Wilson, Sheffield, with Prof. T. Turner, Birmingham, hon. treasurer, and Prof. H. C. H. Carpenter, Manchester, and W. H. Johnson, Manchester, hon. secretaries.

Professor Turner presented the first annual report, which he described as very satisfactory, announcing receipts since the formation of the Institute, amounting to £665 2s. 4d., with payments £234 12s. 3d., and a balance in hand of £430 10s. 1d. Subscriptions had been received from 273 ordinary members, and five student members, while the contributions to the special preliminary fund were £82 5s. 6d. The professor hoped that the £200 required for the furnishing of the offices just taken at Caxton House, London, would be specially contributed. A publication committee would consider the provision of a journal worthy of those branches of metallurgy which the institute was intended to develop.

THE FOUNDRY AND MANUFACTURERS' SUPPLY ASSOCIATION.

President, F. N. Perkins, Freeport, Ill.; Treasurer, J. S. McCormick, Pittsburgh, Pa.; Secretary, C. E. Hoyt, Chicago, Ill. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the association are for the commercial and technical education of the iron and metal industry. Annual Exhibition and Convention with the American Foundrymen's Association, latter part of May each year in a succession of cities, as invited. The 1909 Exhibition will be held at Cincinnati, Ohio, the week of May 17th.

Secretary Hoyt has issued the following announcement:

"We have received official notice from Dr. Moldenke, secretary of the American Foundrymen's Association, that the 1909 convention of that association will be held in Cincinnati during the week of May 17, and President F. N. Perkins instructs me to notify you that the Foundry and Manufacturers' Supply Association will follow the usual custom of holding their annual meeting and exhibit at the same time and place. Some of the officers of the association were in Cincinnati December 20, and while there, met the Cincinnati members of the association and representatives of the Cincinnati Conventional League, for the purpose of considering the accommodations that were available for the exhibits. The following are extracts from a letter written to the secretary by Will Finch, secretary of the Cincinnati Convention League:

"'The Convention League, in connection with a Citizens' Committee, to be formed later, will undertake to provide for your association the south wing of music hall, known as Horticultural Hall, for an exhibit of one week, probably beginning May 17, which carries with it the right to use the hall one week prior, for the receipt of exhibits, and one week afterward, for the clearing out of them. This hall we will turn over to you for this period, properly lighted, without expense to you. We will also undertake to provide, for such of your exhibits as cannot be taken care of in music hall, by reason of their prohibitory character from a fire standpoint. A temporary building will be erected on the banks of the canal, in the rear of Horticultural Hall, said building to be of cheap construction, but of a character to answer your requirements.'

"The Cincinnati people extend their characteristic hearty welcome to the Foundrymen's Association, and with the convention city located so near the center of the foundry interests of this country, all indications are that we will have by far the largest convention and greatest exhibit in the history of the association. There will be an executive meeting of the association in Cincinnati, February 5, for the purpose of completing arrangements and planning the 1909 campaign. Soon after that date we will send out a plan of the exhibit buildings and announce a scheme for awarding space simultaneously to all members. Previous to that time space will not be assigned to anyone.

"We have recorded a majority vote on the new constitution, and the responses to the special assessment will place the association out of debt; and with good prospects for many new members, the future of the association and the success of the Cincinnati Convention are assured.

"Full particulars will follow later. In the meantime, if the secretary can be of assistance to you, write him about it."

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS' ASSOCIATION.

President, Harry Cutler; Treasurer, Harry M. Mays; Secretary, Everett L. Spencer, all of Providence, R. I. All correspondence should be addressed to the Secretary, Everett L. Spencer, 42 Weybosset Street, Providence, R. I. The objects of the Association are for the commercial and educational welfare of manufacturing jewelers and silversmiths.

MANUFACTURING JEWELERS.

During the past month Secretary Spencer issued the program of the winter banquet of the association, which was held at Infantry Hall, South Main street, Providence, R. I., Saturday, February 13, 1909. Lists of those present at the banquet showed an attendance of 550 members and guests. The speakers present included Hon. William E. Borah, U. S. Senator from Idaho, topic: "Abraham Lincoln"; Dr. S. Parks Cadman, Brooklyn, N. Y. Topic: "Abraham Lincoln from an Englishman's Standpoint"; Hon. Percival D. Oviatt, Rochester, N. Y., Secretary National Lithographers' Association; His Excellency Aram J. Pothier, Governor of Rhode Island; Hon. Henry Fletcher, Mayor of Providence; His Excellency Senor Gonzalo de Quasada, Cuban Minister to the United States. Toastmaster, Hon. George H. Holmes. The partial list of officers and committees of the Jewelers' Association are as follows: President, Hon. Harry Cutler; vice-presidents, Theodore W. Foster, George K. Webster, Albert A. Bushee; treasurer, Harry M. Mays; secretary, Everett L. Spencer; executive committee, Everett L. Spencer, chairman; Harry M. Mays, Frank B. Reynolds. Directors: Roswell C. Smith, George H. Holmes, Frank B. Reynolds, T. S. Carpenter, Arthur O. Ostby, Charles T. Paye, William P. Chapin, Wm. A. Schofield, Harold E. Sweet. Advisory Council: George H. Holmes, Providence, chairman; Theodore W. Foster, Providence; Wm. P. Chapin, Providence; Roswell C. Smith, Providence; Arthur O. Ostby, Providence; Eustace Crees, Providence; Everett L. Spencer, Providence; Henry G. Thresher, Providence; Charles W. Dunbar, Providence; George K. Webster, North Attleboro; Charles T. Payne, North Attleboro; Walter B. Ballou, North Attleboro; T. S. Carpenter, Attleboro; Harold E. Sweet, Attleboro; R. C. Thompson, Attleboro. Press Committee: Frank T. Pearce, Wade W. Williams, J. M. Buffinton. Audit Committee: Ralph S. Hamilton, George H. Cahoone. Membership Committee: Charles T. Paye, Arthur O. Ostby, T. S. Carpenter, Wm. A. Schofield.

ASSOCIATED FOREMEN PLATERS.

Messrs. Charles H. Proctor and C. S. Barbour, Jr., foremen platers, are advocating the organization of this association, the objects of which are for the educational welfare of platers. All correspondence should be addressed to Charles H. Proctor, 621 Chestnut Street, Arlington, N. J., or care of THE METAL INDUSTRY. The first meeting to be determined by the platers who are desirous of joining this association.

Since the publication in the January number of THE METAL INDUSTRY of an appeal by Charles H. Proctor for the formation of a Platers' Society, we have received many letters from foreman platers, advocating the organization of such a society and saying that they have a few dollars to invest for the object. The appeal of Mr. Proctor was so successful that it is probable the proposed society will shortly take definite shape and a call will be issued for a meeting, the last Saturday afternoon in February. We herewith publish a sample letter which voices the opinions of all:

FOR A NATIONAL SOCIETY OF PLATERS.

To the Editor of THE METAL INDUSTRY:

Mr. Charles H. Proctor's movement toward forming a national society of electroplaters is deserving of energetic support from all platers as well as those interested in electroplating. An organization of this kind will prove of untold advantage to platers as well as to the platers' employers. Certainly something should be done to awaken the plater to the fact that, from a scientific standpoint, he is way behind the times. By means of an organized society, where each plater can come forward and air his views on matters relating to his particular line of work, great aid will be given to the entire plating fraternity.

I have one suggestion to make and that is that the society have a little wider field and include other branches of metal finishing. By other branches I refer chiefly to japanning and lacquering, as these two forms of metal finishing are in many factories under the supervision of the foreman of the plating departments. There is plenty of room for improvement in both of these fields and they would benefit by being included with electroplating.

I feel confident that Mr. Proctor will receive enthusiastic support from all quarters, but if not there is no reason for discouragement, as once a society of this character is in full swing, there will be many who will hasten to join. Many opinions favorable to the formation of this society have been expressed, but they are not likely to come out in writing. I believe, however, that the silent vote will be a big one as soon as the good work gets under way.

Like Mr. Proctor, I have a few dollars for the good of the cause.

PERCY S. BROWN.

New York, January 23, 1909.

ITEMS OF INTEREST TO THE INDIVIDUAL.

George Thompson, in charge of the brass department of the Kennedy Valve Company, Elmira, N. Y., is making a trip through the West, and visiting many of the brass working plants.

J. R. Owen has resigned as secretary of the Michigan Copper and Brass Company, of Detroit, Mich., his resignation being purely voluntary. During Mr. Owen's connection with the company their mill was started and brought up to an output which gave a fair return on the capital invested.

Harry Cutler, president of the New England Manufacturing Jewelers and Silversmiths' Association, is serving his first term as a representative in the Rhode Island legislature. He introduced a bill recently requiring that all bags of coal weighing less than 100 pounds bear a tag containing the weight of the coal.

G. P. A. Schmitz, proprietor of the machine works of August Schmitz, Dusseldorf, 64, Germany, is on a business trip to the United States. Mr. Schmitz has made a number of visits to this country and at one time was employed for two years in the works of Brown & Sharp, Providence, R. I. He is now a manufacturer of rolling mills at Dusseldorf.

Mr. O. E. Casperson, president of the Waukegan Brass Manufacturing Company of Waukegan, Ill., was formerly vice-president of the Northern Brass Works of that city. Mr. C. F. Kressin, the vice-president of the Waukegan Brass Manufacturing Company, was not connected in any way with the Northern Brass Works, as had been reported.

Announcement is made by the Standard Roller Bearing Company, Philadelphia, of the further expansion of its sales organization by the appointments of F. M. Germane, formerly sales manager, as assistant general manager of the company; T. J. Heller as sales manager, and F. W. Lawrence as Western representative, the latter with headquarters at Chicago.

It is reported that R. A. Wood, of Ansonia, Conn., has been appointed superintendent of the mills of the Plume and Atwood brass factories at Thomaston, Conn. Mr. Wood was formerly superintendent of the Manhattan Brass Company, New York, the Chase Rolling Mill Company, Waterbury, and more recently the Seymour Manufacturing Company of Seymour, Conn.

In the article relating to the Institute of Metals, published in the December number of THE METAL INDUSTRY, the chairman was mentioned as Henry Wiggin, when according to the English custom it should have been Sir Henry A. Wiggin, Bart. The business of the firm is the smelting and refining of nickel and manufacturing German silver and chemical products. The plant is at Birmingham, England.

Pierce G. Smith, formerly sales manager of the Allyne Brass Foundry Company, Cleveland, Detroit and Buffalo, is now connected with the City Brass Foundry Company of Cleveland, in the same capacity. The City Brass Foundry Company are one of the large producers of aluminum and manganese bronze castings for the automobile trade and report that business is improving very rapidly.

Mrs. Frances A. W. McIntosh, formerly advertising manager of the Buffalo Forge Company and associate companies, has resigned that position to open an office at 103 Anderson Place, Buffalo, N. Y., where her services in the preparation of and printing of advertising literature can be secured. Mrs. McIntosh has been publicity manager of a number of large manufacturing companies and is thoroughly familiar with the business.

DEATHS

Cyrus R. Robinson, owner and manager of the firm of Samuel Eastman & Co., Concord, N. H., died December 10, 1908, at his home in that city. The firm manufactured high pressure fire engine nozzles which were extensively used by all the large cities of the United States, and Mr. Robinson had greatly increased the business since he had taken hold of the concern.

William Scott, inventor of the Scott valves and a brass and iron manufacturer, died in his home, 697 Fourteenth avenue, Saturday, January 23, 1909, after a long illness from a complication of diseases. Mr. Scott was 64 years of age and had resided in Detroit thirty years. When he first settled in this city he became superintendent of the Murphy Iron Works, and later was connected with the Galvin Brass Works. Of recent years he has been with the Roe Stephens Manufacturing Company.

Adolphus Bavier, a prominent man in the clock industry, died at the Waterbury Hospital, Waterbury, Conn., Dec. 6, 1908. Mr. Bavier was 54 years old and one of the best-known men in the brass business in New England. He was an employee of the Waterbury Clock Company for over 30 years, starting with that concern when it was in its infancy and working up until he became general foreman. Mr. Bavier was considered an expert on blanking and drawing of sheet brass. He leaves a wife and two sons.

Edward A. Barnard died at his home in New Britain, Conn., on January 26. He had been in failing health for about two months. Mr. Barnard was an expert chemist and silver plater, and had been connected with Russell & Irwin Manufacturing Company of New Britain for the past seven years. Here he had occupied the position of chemist and was in charge of the plating department.

A large number of foremen platers throughout the country owe their success to Mr. Barnard, he having been a famous teacher of the art of plating. He was a rare combination of practical man and scientist and in the estimation of many he stood alone. Mr. Barnard was a very active man in social and fraternal circles, being a member of several organizations. He leaves a wife and five children, three daughters and two sons. Deceased was 55 years old.

Edward F. C. Young, President of the Joseph Dixon Crucible Company of Jersey City, N. J., died on December 9th, 1908, at the age of 73 years. Mr. Young was appointed receiver for the Dixon Company some years ago, and by directing upon its tangled affairs his great business ability brought it up to its present high commercial position.

Mr. Young was a man of wide social, religious and business attainments. He was a member of Old Trinity Methodist Church in York street, Jersey City, from early manhood until his death and was deeply interested in its progress and welfare. He was interested as officer and director in 21 companies of various character, including industrial concerns, banks, trust companies and railroads. He was also a member of eight different social, athletic and patriotic clubs and associations. A widow, son and daughter survive him and will carry on the large amount of benevolent and charitable work he began.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

February 8, 1909.

February, one of the dullest months of the year as a rule, is not any brighter this year than last, but the prospects still continue to be encouraging and the approach of spring is looked forward to with a much better feeling than twelve months ago. Inventory has been completed and the majority of the manufacturing companies are awaiting the expected advent of orders.

In a few cases the manufacturers of small brass and cheaper metal products are already feeling a genuine boom and are forced to keep their hands working overtime a few hours each week. This good fortune, at present, seems to be restricted to the pin factories. The American Pin Company, which has been one of the busiest hereabouts throughout all the dull months of the year past, is now employing a considerable portion of its hands two or three hours overtime three to five days days a week. The Oakville Company also finds orders coming satisfactorily and is busy full time each week.

In the rolling mills and casting shops there is considerable activity, but it cannot be said that any of these has yet struck more than normal speed. There are many metal workers out of employment, but their number is gradually decreasing and it is expected that all the shops will soon be working with a full complement if spring orders show any increase.

From Torrington during the past week came the news that the Coe Brass Company there, the Torrington branch of the American Brass Company, has posted notices in the machine department of a reduction in the wage scale. Where on Sundays heretofore, the help received double pay, they are now cut to one and one-half. It had been the custom to give one and one-quarter time from 6 to 10 p. m., but in future only regular time will be allowed. The one and one-half wage scale after 10 p. m. will continue in effect. Only a half hour is allowed for supper, the employes being obliged to ring up at 6 p. m. and at 6:30 p. m.

At the annual meetings of the various corporations hereabouts during the past month there was comparatively little change, old officers and directors being re-elected except in one or two cases where vacancies had occurred on account of death or retirement.

It was expected that the meeting of the New England Watch Company would be productive of some radical changes in the operation of that plant, but no evidence of such decision on the part of the stockholders or directors has yet appeared. This shop is almost idle, as far as its watch business is concerned, but this condition is attributed to the general dullness of the past year, rather than the lack of popularity of the product. For years the market has been flooded with a cheaper grade of watches, and when individuals started to economize the watch trade everywhere dropped. Recently the New England Watch Company began to manufacture lockets, but whether this will be developed as a regular feature is not known. This company has one of the finest equipped factories in the world and it is believed within a few weeks there will be some definite evidence of a change for the better in its management.

The Waterbury Clock Company's watch department also has found business dull and upwards of 150 men have recently been put on short time or laid off. Some who are supposed to keep close to the metal industries and their branches have been heard to speculate on the activities of the new watch factory of the Ingersoll firm at Trenton as a cause for the dull time in the watch business here, but it is not believed the Waterbury branches of the Ingersoll concern, which were the first and have had every encouragement for rapid development from that company, will be sacrificed for the benefit of Trenton's plant. Last fall R. H. Ingersoll spent several days here and gave out an optimistic statement as to plans for the further development of the Waterbury end of the cheap watch industry.

One of the finest casting shops in the country has been put into operation by the American Brass Company in the past few weeks, and with the exception of uncomfortable conditions for the workmen it has proved a success. The heating arrangements have developed an unforseen problem and considerable criticism has resulted, but this difficulty is expected to find a quick remedy.

The independent brass firms are working large forces and are keeping fairly busy in practically all departments.

There is great activity in Waterville at present over the plans for the opening in a few months of the Blake & Johnson Company's new plant. This company will remove its rapidly growing business from the center of the city to one of the best factory sites in the Naugatuck Valley before spring has advanced far, and there will be a general shift in the population as a result.

Several of the younger industries of the valley have been successful in Waterville and have economized there on account of the favorable location for shipping and receiving freight. The Chase Rolling Mill Company will in the near future change its centre from the north end of the city to Waterville and for years has been formulating plans for a gradual change. It has long had extensive realty holdings which are considered splendid factory and mill sites, and a continuation of present industrial conditions or steady improvement will expedite its transfer.

The Baird Machine Company reports excellent conditions. This corporation enjoys a steadily increasing business and its future prospects are bright.

Most of the smaller plants are able to keep their normal forces busy on full time, one of the most encouraging indications of a gradual return of general prosperity.

There are comparatively few shipments of copper here, only enough raw material coming in to furnish a ready supply for hurry orders. The price is not considered low enough to encourage buying in large quantities. It is well known that it was the American Brass Company's influence largely which forced copper down first, although that drop, it later developed, was only the precursor of the great drop on the heels of which followed the financial crisis of the fall of 1907.

Summing up local conditions, all that can be said is that the outlook, while not discouraging to the manufacturer, is dubious for the workman, on account of the large numbers on short time, but there is every reason to interpret most of the present signs for the best. February is not expected to develop a great boom, but with the coming of March a more general activity in all lines is expected, excepting perhaps the watch business.

F. B. F.

PROVIDENCE, R. I.

February 3, 1909.

The jewelry manufacturers and allied trades in Providence and the Attleboros are doing a fair average business for this time of the year. Fears that the business depression of the past year would have a deadening effect on the spring trade have been proved to be groundless, for the trade has continued strong although by no means so active as in years prior to the panic.

The returning wave of prosperity is being felt most by the manufacturers of cheap and middle class goods. These are apparently doing as much business as ever and are working on full time and with full working forces. Salesmen returning from trips through the country present encouraging reports and indications point to a well-sustained season straight through to the summer months. The manufacturers of the highest grade of gold goods are not disappointed that business is not rushing with them, for at this time of year they do not expect much business. Most of the concerns are working on the usual spring schedules, however, making up stock with the belief that their business will feel the usual quickening as fall approaches.

The Burns Manufacturing Co., which operated in this city for 20 years until five months ago when it suspended business, has been incorporated for $150,000 under the laws of Massachusetts

and will at once begin the manufacture of gold rings in Valley Falls, this State. The plant will at first employ about thirty hands.

Three manufacturing jewelry corporations have recently filed incorporation papers. One is the C. S. Williams Company, capitalized at $5,000, which will manufacture jewelry novelties. William I. Macomber, William W. Blades and Matthew J. Gallagher incorporated the Macomber Manufacturing Company with a capital of $25,000. They will manufacture jewelers' tools and machines of all kinds. The third company has just been formed and has not announced its plans. It is capitalized at $50,000. It will do a jewelry manufacturing business in Providence and is known as the Eastern Jewelry Company. The incorporators are James C. Collins, Jr., Percy W. Gardner and Charles W. Collins.

The R. F. Simmons Company, one of the leading jewelry concerns of Attleboro, has declared a cash dividend of 4 per cent. for the employes of their company on the wages of the past year. This allows $6,300 to be divided among the help. This is the thirtenth employes' dividend paid by the company.

The remarkable growth of the jewelry industry in Rhode Island during the past thirty-six years is portrayed in the following recently published statistics, presented for fourteen of the State's leading industries: Rhode Island led all other States and territories in the value of the product of its jewelry establishments in 1904 and 1906. In both of these years as well as in 1899 this State was fourth in rank among the various industries of the State.

Comparing the returns of 1906 with those of 1899, the number of establishments decreased from 210 to 201, a decrease of nine, or 4.3 per cent. Capital invested increased from $8,787,502 to $14,733,683, an increase of $5,946,181, or 67.6 per cent. The average number of wage earners amounted to 8,143 in 1906, against 7,102 in 1899, an increase of 1,041, or 14.6 per cent. Wages amounted to $4,677,573 in 1906, against $3,145,577 in 1899, an increase of $1,532,016, or 48.7 per cent. The cost of materials used amounted to $11,270,425 in 1906, against $6,176,854 in 1899, an increase of $5,093,571, or 82.4 per cent. The value of products including custom work amounted to $21,049,827 in 1906, against $13,229,313 in 1899, an increase of $7,820,514, or 59.1 per cent.

The average annual income of male employes in jewelry increased from $545 in 1899 to $668 in 1906, an increase of $123 or 22.3 per cent.; women from $293 to $392, an increase of $99, or 33.7 per cent., and children from $220 to $276, an increase of $56 or 25.4 per cent. In 1899 each employe averaged $1,862 worth of product to the manufacturer against $2,584 in 1906, an increase of $722 per employe or 38.8 per cent.

In silversmithing and silverware the capital invested amounted to $2,976,347 in 1906, against $1,881,440 in 1899, an increase of 98.6 per cent. The average number of wage earners in 1906 was 2,360 against 1815 in 1899, an increase of 30 per cent. Wages amounted to $1,661,460 in 1906 against $1,099,642 in 1899, an increase of 51 per cent. The cost of materials used amounted to $2,976,347 in 1906, against $1,881,440 in 1899, an increase of 58.1 per cent. The value of products amounted to $6,654,736 in 1906 against $4,249,190 in 1899, an increase of 56.6 per cent.

The twenty-fourth annual meeting of the Providence Jewelers' Board of Trade was held Jan. 23. The year showed a net gain of fifty members, bringing the total up to 201. The following were elected directors: Robert E. Budlong, of S. K. Merrill & Co.; Henry Wolcott, of Wolcott Manufacturing Company; William P. Chapin, of Chapin & Hollister Company; J. D. Warren, of Warren & Williams; William A. Schofield, of Schofield, Battey & Company; Everett L. Spencer, of E. L. Spencer Company; Edward B. Hough, of Wightman & Hough Company; Alfred K. Potter, of E. A. Potter Company; Harvey Huestis, of Hutchinson & Huestis; L. H. Bosworth, of Potter & Buffinton Company; George H. Holmes, of George H. Holmes & Co.; Fred D. Carr, of Ostby & Barton Company; Fred A. Ballou, of B. A. Ballou & Company, Inc., all of this city; Herbert C. Bliss, of Bliss Brothers Company; C. J. McClatchey, of Horton, Angell Company; Charles P. Keeler, of McRea & Keeler; Harold E. Sweet, of R. F. Simmons Company, all of Attleboro; George W. Cheever, of Cheever, Tweedy & Company, North Attleboro; Fred E. Sturdy, of J. F. Sturdy's Sons Company, Attleboro Falls, and John W. Pickering, of Pickering, Metcalf & Company, of Leominster.

The directors have organized with the following officers: President, Robert E. Budlong; vice-presidents, Fred D. Carr and Herbert C. Bliss; secretary and treasurer, Marcus W. Morton (for twenty-first consecutive term); manager, Horace M. Peck; executive committee, Robert E. Budlong, Everett L. Spencer and Alfred K. Potter.

Providence metal men do not agree on the advisability of establishing a national tariff commission. B. A. Ballou, president of B. A. Ballou & Company, manufacturing jewelers, stated recently that he was very much in favor of a plan to establish such a commission. Ralph S. Hamilton, of Hamilton & Hamilton, Jr., jewelry manufacturers, declared in favor of the appointment of an advisory commission, but was not so sure of the necessity for a permanent board. "I should not favor," he said, "any commission which would be put in a position to dictate to Congress; its functions should be merely to sift the facts and report on them." Henry G. Thresher, secretary and treasurer of the Waite-Thresher Company, manufacturing jewelers, said simply, "We don't favor the plan. We're not in that bunch."

The casting at the factory of the Gorham Manufacturing Company of a statue of General Philip Sheridan marked an interesting event, in that the colossal horse was cast in one piece. This was the largest single bronze casting made in the history of the world, and the first attempt brought perfect results.

E. S. U.

ROME, N. Y.

February 1, 1909.

ELECTIONS.—At the annual meetings of the stockholders of the Rome Brass and Copper Company, the Rome Tube Company and the Rome Metal Company, January 29, the elections resulted as follows: Directors, W. J. L. Kingsley, T. H. Stryker, W. L. Kingsley, C. C. Reid, William Pierrepont White, Robert F. Hubbard, F. A. Ethridge, Barton Haselton, Jesse J. Armstrong; inspectors of election, J. S. Wardwell, P. C. Thomas; officers, President, W. L. Kingsley; vice-president, Thomas H. Stryker; secretary and treasurer, Barton Haselton; assistant secretary, H. J. Rowland.

The annual meeting of the stockholders of the Rome Turney Company was held at the company's office in this city January 29. The following directors were elected: W. L. Kingsley, Barton Haselton, George W. Turney, John S. Wardwell and T. H. Stryker. At a subsequent meeting of the directors these officers were elected for the ensuing year: President, W. L. Kingsley; vice-president, Barton Haselton; secretary-treasurer, George W. Turney.

James H. Matthews Company, Court street, Rome, N. Y., manufacturers of all kinds of metal signs, are now preparing to enlarge their brass foundry and polishing room.

A. R.

BIRMINGHAM, ENGLAND.

February 1, 1909.

The revised regulations under the Factory and Workshops Act, in connection with the coating of metal articles with lead or tin mixtures, has caused some little opposition in Birmingham because of the serious obligations laid upon employers. These have been previously referred to in these columns and it will be remembered that among other regulations are prohibitions of the use of lead in tinning metal hollow ware, the provision of a health register containing the names of all persons employed, medical examination at specified intervals, the provision of suitable cloak rooms, meal rooms, and lavatory accommodation, washing of hands before partaking of food, and other details. Employers in certain directions object to these additions to their responsibilities, and their objections are to be heard at a home office enquiry to be held at the Council House, Birmingham, on February 16. All parties will then be heard. It is understood that other regulations affecting the vitreous enameling of metal or glass will also be the subject of a home office enquiry.

The old Birmingham firm of Hart Son & Peard has just completed a commission from the government of Brazil for three pairs of decorative bronze doors intended for the principal entrance to the new State Library of Brazil, now being erected at Rio de Janeiro at a cost of over £500,000.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Standard Metal Manufacturing Company, of Newark, N. J., is making a specialty of the larger type of automobile horns, of which they are the only American manufacturers.

The Rockwell Furnace Company, of 26 Cortlandt street, New York, have bought the Jersey City factory, including drawings, patterns and all remaining property of the trustees of the former Rockwell Engineering Company, and are continuing the business of that company. They report many orders.

The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., builders of all kinds of sheet metal working machinery, report a considerable improvement in business to what it has been for the past ten months. The company reports that most of the Waterbury industries are running to within 90 per cent. of their normal basis.

At a meeting of the Board of Directors of the Joseph Dixon Crucible Company, held on Monday, December 21, 1908, Vice-President George T. Smith was elected president to fill the vacancy caused by the death of the late Edward F. C. Young, and Mr. William H. Corbin, counsel for the company, was elected vice-president.

The General Chemical Company, Moro Phillips Works, 608 Philadelphia Bourse, Philadelphia, Pa., issue a letter sheet giving the different sizes of phosphorus they manufacture in sticks and cans. The sticks are ⅝ inch diameter, 10¾ inches ling and sold in 11-pound cans, ten cans to a case. The cakes are sold in weights of 1, 2, 2¼ and 2½ pounds, in 20, 15¾ and 17½ pounds to a can, four cans to a case. Further particulars may be had from the General Chemical Company.

The New York Metal Exchange, in common with its usual custom, has issued the annual statistical review of domestic and foreign metal markets. This review is sent free of charge to every subscriber of the Official Daily Market Report of the New York Metal Exchange, which is sold in combination with a year's subscription to THE METAL INDUSTRY. The Statistical Review contains 24 pages of tables relating to the actual production and price movements of metals.

The Detroit Brass and Copper Company, of Detroit, Mich., report the best December for two years. They are now running their large plant to full capacity, with the possible exception of the copper wire mill. This mill is so large in extent as to require a very unusual amount of business to force it up to full capacity. It is capable of turning out, under normal conditions, from three to four million pounds of copper wire per month, and from five to six million pounds when running full capacity.

No definite statement has yet been made by the various companies manufacturing aluminum goods in relation to the proposed combination of all of the concerns, the news of which was reported in the January number of THE METAL INDUSTRY. The Aluminum Manufacturing Company, of Two Rivers, Wis., state that there is not under way any general combination of the aluminum cutting-up shops so far as they know, but it is possible that one or two factories will consolidate in the near future.

It has been currently reported in the daily press that The American Brass Company had received an order from the Navy Department for 2,000 seamless brass bands for 12-inch shells. It was further stated that these bands would be made at the Ansonia, Conn., plant, as the only place where they could be made. Officials of the Coe Brass Manufacturing Company, both at Torrington and Ansonia, Conn., deny the truth of these rumors, and state that they have no contract whatever with the Government for these shells.

The Elkhart Brass Manufacturing Company, Elkhart, Ind., has just received a big order, the second largest in its six years' history. It is for 20,000 lock meter gas cocks, and 500 similar cocks of much larger pattern. The order will require about sixteen tons of brass, and the work of this raw material will be a considerable item in the total expense of the job, which is to run through about four months of the factory's time. The plant in the meantime will be, as usual, chiefly devoted to the manufacture of fire hose couplings.

Michigan Copper & Brass Company, Detroit, Mich., stockholders were told at the annual meeting, held in January, that the plant was now running to 80 per cent. of its capacity, and that there had been an improvement in business every month since the plant was started, 16 months ago. The directors are: George H. Barbour, Jeremiah Dwyer, Fred M. Alger, James E. Danahar, Fred T. Moran, D. M. Ireland, James T. Whitehead, E. J. Corbett, W. A. Corby. After the meeting the stockholders were taken to the plant in a special car provided by the company.

The New York State Legislative Investigating Committee, which is examining the methods of speculation at the New York City Exchanges, recently investigated the Metal Exchange and Chairman Horace White reported that the Exchange is useful to buyers for metal companies. From the Exchange reports these buyers can obtain prices and production that aids them. While no sales of consequence are made on the Exchange, copper can generally be bought elsewhere at the prices quoted on the Exchange. The New York Metal Exchange has always made a point to supply its members with useful information.

The Adver-Novo Company, Royal Bank Building, Notre Dame and Seigneur street, Montreal, Canada, write us as follows:

"Our company was founded by G. S. Williams, who, after advertising and obtaining pupils and making a number of contracts also incurring numerous liabilities, he has absconded, having misapplied various sums of money which had been paid in for the purpose of building up the business. He is a first-class plater, having had some twenty years' experience and without his services as he well knows, we are unable either to conduct the business or carry on the classes for instruction. We ask you to make public these circumstances that there may be a possible chance of our tracing him in the future."

The Metal Dross Economy Company, of Bristol, Conn., are particularly pleased with the success they are having with their new skimming trough which was described in the January number of THE METAL INDUSTRY. The company recently equipped three large foundries and have received word from all of them that the results are very satisfactory. George Summers, of the Bridgeport Brass Company, Bridgeport, Conn., recently paid the Metal Dross Economy Company a visit and remarked that the skimming trough was the greatest saving device in the foundry he had seen in his fifty-four years' experience. A. S. Hassis is the president and sales manager, and W. H. Carpenter vice-president and general manager of the Metal Dross Economy Company.

On February 1, 1909, the metal department of Hazard, Coates & Bennett Company, of Rochester, N. Y., was taken over by the Genesee Metal Company of the same city, Hazard, Coates & Bennett Company continuing in the iron and steel business. In making this change, the management and ownership remain identically the same as heretofore. This transfer is made so as to have a complete separation of the metal business from iron and steel, and which will increase the lines of the manufacturing end.

The Genesee Metal Company will be in a position to manufacture all kinds of white metals made in iron or brass

moulds, and will be pleased to give figures to any parties who are interested in this branch of the industry; also to make all formulæ of brass and bronze composition in ingot form.

The Ellwood Ivins Tube Works, Oak Lane Station, Phila., have recently added another—the fifth—new annealing furnace, twenty-four feet long, six feet wide, by eight feet in height. They are now drawing seamless steel tubes four inches in diameter, and say they expect to be equipped in short time to produce cold drawn seamless steel tubes as large as five inches in diameter. Their range of diameters will therefore be from a tube as small as a hypodermic needle on up to five inches in diameter. These works claim in addition to their low carbon steel tubes, to be the only makers of a seamless tool steel tube or crucible steel tube in the world. They report a brisk trade and eight weeks behind on orders. Their specialty is extremely accurate tubing on all metals and they are the oldest seamless steel tube mill in America.

One of the many evidences of the return of prosperity is found in the fact that the Carborundum Company, manufacturers of the wonderful abrasive, Carborundum, is to increase its already extensive plant at Niagara Falls, with the addition of a four story brick and steel structure, and the consequent increasing of its output and working force. The new building is to be 225 feet in length and 60 feet in width. One entire floor of the building is to be given over to the manufacture of Carborundum sharpening stones, hones, scythe stones and other specialties. The other floors will be used for the mixing and wheel moulding departments and for storage room. During the past year the Carborundum Company has added several new lines to its manufactured products. These include garnet-paper and cloth, used largely in the wood and furniture trade, and emery paper and cloth, used in finishing metal and machinery parts.

The show held at Madison Square Garden from January 16 to 23, under the auspices of The Association of Licensed Automobile Manufacturers, outshone anything of the kind ever attempted in this country. The attendance was larger, the interest displayed more intense, and above all, a larger number of advance sales were consummated than at any previous show. The gratifying success of this exhibition speaks well for the general prosperity of the country, it shows that confidence in business is returning and that financial conditions are resuming their normal state. There were exhibited during the week at the Garden: Complete gasoline cars, 117; gasoline chaises, 28; motor business wagons, 19; motor business chaises, 5; taxicabs, 3; steam cars, 6; steam chaises, 1; electric carriages, 37; and electric chaises, 5. There were 138 water cooled motors, 7 air cooled, 140 of the four-cycle type and 5 of the two-cycle. The jump spark still leads in ignition, there being 123 of this style and 20 using the make-and-break ignition system.

REMOVALS

Henry Binley, manufacturer of the Zephyr Aeolian Chimes and other specialties, has removed from 115-117 Worth street to 85 Centre street, New York.

The address of Philip Sievering's plating, polishing and buffing establishment, which was given in the January issue of THE METAL INDUSTRY as 213 Centre street, New York, is now 255 Centre street, the business having been moved from the former location some time ago. At the new location Mr. Sievering has excellent facilities for doing all kinds of plating, polishing, buffing, lacquering, etc.

The American Steam Gauge and Valve Manufacturing Company, 208 to 220 Camden street, Boston, Mass., announces that on and after January 1 John B. Guthrie will be its sole representative in the Pittsburg district, with offices in the Columbia Bank Building, Fourth avenue and Wood street, Pittsburg, Pa. They have also removed the office of its Southern branch, located for several years in the Equitable Building, at Atlanta, Ga., to 524-525 Candee Building, of that city.

REORGANIZATIONS

J. J. FREEMAN COMPANY, Toledo, Ohio; capital, $75,000. Incorporators, J. J. Freeman, Norman E. Hascall, Fred Snider, Martin F. Kraft, Aaron Chesbrough and Reno S. Freeman. The incorporation is a reorganization of the old firm of Freeman & Company and will continue the business at the old store.

The Hoskins Company has been reorganized, and will be conducted as the Hoskins Manufacturing Company, Detroit, Mich., after February 1. They will occupy a plant 200 x 60 ft., formerly known as the Superior Match Company's plant, at Lawton avenue and the Michigan Central railroad tracks. The new organization will carry on the business with increased capital and much larger facilities. The present manager, E. F. Hoskin, and electrical engineer, A. L. Marsh, will continue with the new concern.

INCORPORATIONS

SUPERIOR BRONZE COMPANY, Wilmington, Del.; capital, $10,000. To manufacture castings, etc.

JACKSON BRASS FOUNDRY COMPANY, Jackson, Mich., have filed articles of incorporation with the Secertary of State. The capital is $25,000.

CHATTANOOGA JEWELRY COMPANY, Chattanooga, Tenn.; capital, $15,000. Incorporators, S. T. Rice, W. G. Dillon, J. M. Mosier, M. C. Dillon, A. W. Mosier and Jennie Rice.

UNITED WATCH COMPANY, Chicago, Ill.; capital, $2,500; manufacturing and dealing in watches, watch movements and appurtenances; Leo Koretz, M. O. Joburn and Francis E. Mathews.

W. B. MCCARTHY METALS COMPANY, New Haven Conn.; capital, $10,000. Incorporators, Wm. B. McCarthy and Josephine B. McCarthy, Milford, and Margaret M. Hogan, New Haven.

BELMONT BRASS BED COMPANY, the Bronx; capital, $5,000; to manufacture beds and cribs of brass, etc. Incorporators, Wolf Bartand, David Wolin, Jacob Feinberg, Wolf Becker, all of the Bronx.

SYRACUSE DIE MOLDED CASTING COMPANY, Syracuse, N. Y.; capital, $10,000; to manufacture die molded castings. Incorporators, O. Milton Gale, Otta E. Stowell and Lila M. Johnston, all of Syracuse.

PITTSBURGH SELF-STRIPPING MOLD COMPANY, Crafton, Pa.; to manufacture and deal in brass molds, etc. Capital $100,000. Incorporators: J. H. Mering, George E. Campbell and Carl E. Bailey, all of Crafton.

MONARCH METAL MANUFACTURING COMPANY, Kansas City, Mo.; to manufacture sheet metals and roofing materials; capital, $5,000. Incorporators, E. F. Mulligan, Edward C. Wright, Vernon Ross, T. J. Lysaght and others.

B. F. GLEASON MANUFACTURING COMPANY, Brockport, N. Y.; capital, $10,000; to manufacture and deal in all kinds of metal goods, cast, stamped and rolled. The directors are Philip F. Swart, Mina E. Swart and Geo. E. Benedict.

CUMMINGS MANUFACTURING COMPANY, Norton, Mass.; capital, $30,000. President, Arthur Cummings, Attleboro; treasurer, Orvil W. Smith, No. 101 Sears Building; clerk, Leden J. Bradsett, 79 Milk street, both of Boston, Mass.

METAL GOODS MANUFACTURING COMPANY, organized at Portland, Me., for the purpose of doing a general business in electrical and mechanical apparatus with $10,000 capital stock. Officers: President, Charles L. Marston, Yarmouth; treasurer, Chester J. Lawrence, of Portland.

THE PITTSFORD METAL WARE COMPANY, of Pittsford, N. Y., has been incorporated with a capital of $23,000, for the purpose

of mining, milling and manufacturing metal products. The incorporators are H. H. Hilficker, Pittsford; J. E. Byrne and C. H. Riek, of Rochester, N. Y.

THE GINNEL MANUFACTURING COMPANY, of Brooklyn, N. Y., has been incorporated with a capital of $30,000 to manufacture jewelry. The incorporators are Henry Ginnel and William S. Ginnel, of Good Ground, L. I., and John S. Durand and Patrick V. Sullivan, of New York.

THE ATLAS TORCH AND BRASS COMPANY, of New York, has been incorporated with a capital of $100,000, to manufacture plumbers', tinsmiths', mechanics' and engineers' supplies. Incorporators are Aaron Davidson, Louis Schenmitz and Julius Braunstein, all of New York, N. Y.

THE CASKEY VALVE COMPANY, 99 John street, New York City. Capital, $10,000. To manufacture blow-off hydraulic valves. The company believes that it has the only value which will stand a working pressure of 10,000 pounds without leakage. The valves will be made by the American Manganese Bronze Company, 99 John street, New York. The officers of the Caskey Valve Company are R. M. Baily, president; C. R. Spare, vice-president and W. A. Locke, secretary and treasurer.

FINANCIAL

President Daniel Guggenheim has addressed a letter to the stockholders of the American Smelting and Refining Company, accompanying a statement of assets and liabilities as of Oct. 31, and a profit and loss statement for the six months ended on that date, which gave a further promise of frequent statements to stockholders. The net earnings from operations in the period were $3,917,683, out of which $75,922 was charged for construction and improvements. Out of the balance of $3,841,760, dividends of 3½ per cent. on the preferred, amounting to $1,750,000, and of 2 per cent. on the common, amounting to $1,000,000, were declared, leaving a net surplus to profit and loss of $1,091,760.

PRINTED MATTER

OVENS. E. E. Steiner, Newark, N. J., has issued a 16-page circular showing the construction and design of his portable ovens for japanning metal and wood, enameling, baking, drying, blueing and many other purposes. He includes a list of firms using these ovens.

ROESSLER & HASSLACHER CHEMICAL COMPANY, 100 William street, New York, have issued a handsome calendar for 1909, embellished with a reproduction of Napoleon Boni's painting, "The Forge." It contains information relating to their Ferro-Silicon and Silicon-Carbon.

TROUBLE FOR THE BULLY is shown in the reproduction of Robert Brown's N. A., famous painting—on an art calendar issued by New York Brick and Paving Company of Syracuse, New York. This company handles all kinds of vitrified paving bricks, acid proof tiles, etc.

C. G. HUSSEY & COMPANY, of Pittsburg, Pa., have issued a hanger 11" x 14", made of pasteboard and finished to represent an oxidized copper hammered plaque to illustrate the products they manufacture, including rolled sheet, nails, rivets and other small articles of brass and copper.

PAUL S. REEVES & SON, of Philadelphia, Pa., manufacturers of brass, bronze and phosphor bronze castings and ingots, babbitt metal, all grades, and white brass, have issued a folder giving illustrations and specifications of their Tubal Manganese Bronze specially adapted for propeller wheels.

PLATED SHEET METALS is the subject of a four-page folder issued by the National Sheet Metal Company, Peru, Ill. This concern manufactures a number of plated sheet metals of different compositions which have been highly successful in their applications, and in taking the place of solid metals.

OIL VS. COAL, a 16-page pamphlet issued by the Tate, Jones & Company, Inc., of Pittsburg, Pa., describes the various oil-burning appliances and furnaces manufactured by them. The "Kirkwood," Kink, "The burner that's right" is the password by which they introduce these various devices to the trade. The booklet is profusely illustrated with half-tones, showing the furnace and burners in operation, and also contains some flattering testimonials.

CATALOGUE A, relating to Ams power presses for working sheet metal, issued by Max Ams Machine Company, Mount Vernon, N. Y., gives in a comprehensive way full description, together with illustrations of the different styles of power presses and dies. The catalogue also shows the interior arrangement of their extensive shops. Catalogue B contains descriptions and illustrations of the different types of special machinery for silversmiths, and manufacturing arts and crafts.

ADNEWS

The Celluloid Zapon Company, 310 Fourth avenue, New York, are calling attention to their lacquers, which they make for every kind of metal finish.

Platt Bros. and Company of Waterbury, Conn., make a specialty of rolling sheet zinc in long strips of any thickness up to 6⅞" in width, and also zinc rod for storage battery, etc., purposes.

Leach & Garner Company, Attleboro, Mass., call attention to their silver solder. They also make rolled gold plate, gold-plated seamless wire and tubing, sterling silver sheet, wire and tubing.

Green gold and chemically pure gold anodes for Roman work, and other platers' solutions and specialties are announced on another page by H. F. Carpenter & Son, 58 and 60 Page street, Providence, R. I.

The Fairfield Aluminum Company, Fairfield, Conn., one of the largest and best-known makers of aluminum automobile castings, has taken space in THE METAL INDUSTRY in which to advertise their products.

Lewis Thompson & Company, Inc., Philadelphia, Pa., are emphasizing the fact that their Special Grade Mahogany Pattern Lumber is as cheap as white pine and possesses many advantages over it for pattern making.

The engineering department of Batcheller, Clark and Batcheller, 141 Cedar street, New York, is making a specialty of designing and installing complete plants for sand-blasting metal products of all kinds. They guarantee satisfactory results in all cases.

The Metallic Alloys Company, 50 Church street, New York, is prepared to fill orders immediately for 30 per cent. Manganese copper, and for practically all other kinds of alloys, metals and brass founders' supplies. Through their full-page advertisement they invite trial orders.

The Swan & Finch Company, 151 Maiden lane, New York, whose business was established over 55 years ago, are advertising in this issue their direct importations of palm, cocoanut and olive oils, also tempering oils, fish and whale oil soaps, and lubricating oils and greases of all grades which they refine themselves.

The Detroit Testing Laboratory, 1111 Union Trust Building, Detroit, Mich., announce that they have been making a specialty of the analysis of alloys for some time and are thoroughly equipped for accurately analyzing all kinds of metals as well as making physical tests of them. They employ experienced chemists and metallurgists and make accurate analyses and tests at moderate prices.

COPPER PRODUCTION

The copper statistics as published Feb. 10, 1909, are as follows:

	Pounds.
Stock, January 1st	122,357,266
Production, January	112,135,200
Total	234,492,466
Delivery, January	90,362,421
Stock, February 1st	144,130,045

The above figures were published by the Copper Producers' Association. The figures are interesting as showing that the stocks of "marketable" copper increased about 22,000,000 pounds in the month of January, leaving a stock of "marketable" copper on hand February 1, 1909, of 144,130,045 pounds; these figures say nothing about the stocks of blister copper accumulated at the smelters, which probably amounted to over 300,000,000 pounds at the beginning of 1909.

METAL MARKET

NEW YORK, February 10, 1909.

COPPER.—The London market for Standard Copper has shown a steady decline for the month of January and prices at the close are £6 per ton lower—the London market closing weak at £58 5s. being the lowest point reached for several years.

In the New York market copper has been weak during the entire month, consumers have shown no disposition to enter the market and prices at the close of the month are fully one cent per pound lower than at the opening of the year.

This decline in the price of copper was rather unexpected by the trade generally, and the daily press towards the end of last year was very certain that a heavy buying movement would start early in the new year, but the law of supply and demand was stronger than any predictions and prices had to give way.

It must not be forgotten that copper is being produced at steadily increasing rate, while consumption is only at the rate of 60 per cent.; then the exports for the month were below the average, only 18,500 tons against 33,019 tons a year ago, while the imports for January will total close to 12,000 tons, so that, with these figures before us, it is easy to realize that the actual stocks of copper being carried either at the smelters and as refined must be very heavy.

The producers have agreed to publish a monthly table of the stocks of unsold copper. This will be ready about February 10 and is awaited by the trade with much interest.

According to the foreign copper statistics the total visible supply of copper in Europe shows a decrease of 2,700 tons. This is the first time these stocks have shown a decrease in several months.

The market is weak or more or less nominal. Lake is quoted at 13.75, Electrolytic at 13.50, casting brands 13.25.

TIN.—The price of tin in London shows a decline for the month of about £8 per ton.

The New York market has steadily declined with the drop of prices abroad, and consumers have been able to get in some low priced tin for the next two or three months.

The consumption during the month was very good, being estimated at 3,200 tons against 2,850 tons during December. The total visible supply at the end of January shows an increase of 2,000 tons, but with the increased consumption of the next three months this small increase in the visible supply will not be much of a factor and tin prices are likely to be very much higher again.

The prices in New York declined about 2 cents per pound during the month, closing at 27.40. To-day the market is higher owing to the advance abroad, 5-10 ton lots, spot 28¼ cents, with futures about 10 points higher.

LEAD.—The foreign lead market has ruled fairly steady and closes with a decline of about 57 for the month.

The New York market has held very steady with small business reported. Prices at the close are about 5 points below the opening, closing at 5.10 New York delivery carload lots.*

SPELTER.—The London price of spelter has advanced about 10s. per ton during the month and closes at £21 12s. 6d. the highest.

The New York market has held steady and closes about 5 points down for the month. The demand has not been very brisk and consumers have been inclined to hold off.

ANTIMONY.—The foreign price of Hallett's holds steady around £32 10s.

In the New York market prices are about the same as a month ago. Very little interest is taken in this metal and consumers only buy for immediate needs. Cooksons, 8⅛ cents; Hallett's, 7.95; other grades about 7½ cents.

ALUMINUM—The market on Aluminum is steadier and the limit seems to have been reached in the foreign market. The price for the domestic product is nominally 24 cents, but that is probably shaded to meet the foreign market. The basic price of wire and rod stands at 33 cents and sheet at 34 cents.

SILVER.—The price of silver has reacted slightly from the low levels of last year. The New York market opened at 50¼ cents, advanced to 52⅞ and closed at 51⅞. The London market closely followed the fluctuations in America, opening at 23¼d., and closing at 23⅞d.,

QUICKSILVER.—The price of quicksilver has held fairly steady, wholesale lots, $44.50 per flask, with jobbing lots selling at $46 to $46.50.

PLATINUM.—There has been no change in the price of platinum in this market. Ordinary is quoted $22.50 to $23.50 per oz., with hard at $24 to $26.

SHEET METALS.—The base price of sheet copper is unchanged and is quoted nominally at 19 cents, while there are actual sellers of sheets at 17½ cents. In brass the nominal quotation for sheet brass is 15 cents, but this can be shaded on attractive specifications. Copper wire 15¼ base.

OLD METALS.—The majority of old metal dealers looked for a good buying demand and an active market after the turn of the year. The turn of the year came all right, but the good buying demand is not yet in sight and prices have sagged off about one cent per pound in sympathy with the decline in copper and the easier markets in all the white metals. We may see a more active market later on and prices will surely be advanced.

* The lead trust has reduced its price from 4.20 to 4.10 New York, 50-ton lots.

THE JANUARY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	14.50	14.00	14.35
Electrolytic	14.35	13.65	14.00
Casting	14.12½	13.50	13.90
TIN	29.25	27.40	28.10
LEAD	4.30	4.15	4.20
SPELTER	5.20	5.10	5.15
ANTIMONY (Halletts)	8.15	7.95	8.05
SILVER	.52⅞	.50¼	51.75

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 61 Beekman street, New York.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can also furnish daily telegraphic reports of metal prices.

Trade Wants on Advertising Pages 26 to 29 Following

Metal Prices, February 11, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	13.75
Electrolytic, car load lots	13.50
Casting, car load lots	13.25
TIN—Duty Free.	
Straits of Malacca, car load lots	28.25
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2½c. per lb.	
Pig lead, car load lots	4.15
SPELTER—Duty 1½c. per lb.	
Western, car load lots	5.10
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods, 13c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	24.00
ANTIMONY—Duty ¾c. per lb.	
Cookson's cask lots, nominal	8.12½
Hallett's, cask lots	8.00
Other cask lots	7.60
NICKEL—Duty, 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty free	1.30
BISMUTH—Duty free	1.80
CADMIUM—Duty free	1.00
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.51⅞
PLATINUM—Duty free	23.75
QUICKSILVER—Duty 7c. per lb. Price per pound	62c. to 63c.

OLD METALS.

	Price per lb. Cents.	
Heavy Cut Copper	12.00	12.50
Copper Wire	11.50	12.00
Light Copper	10.00	10.50
Heavy Mach. Comp.	10.50	11.00
Heavy Brass	8.00	8.50
Light Brass	6.00	7.00
No. 1 Yellow Brass Turnings	8.00	8.50
No. 1 Comp. Turnings	9.50	10.00
Heavy Lead	3.80	4.00
Zinc Scrap	3.00	3.50
Scrap Aluminum, turnings	6.50	7.00
Scrap Aluminum, cast, alloyed	13.00	16.00
Scrap Aluminum, sheet (new)	16.00	18.00
Old Nickel, solid	19.00	23.00
No. 1 Pewter	18.00	19.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper 10% to 20%....according to quantity	28 to 30
Silicon Copper, 30%, guaranteed " "	30 to 32½
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	10 to 11
Brass Ingot, Red " "	12 to 14
Bronze Ingot " "	11 to 13
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 32 to 40

PRICES OF SHEET COPPER.

BASE PRICE, 19 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " "

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... Base Price.
(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
Mill price, carload lots	7.00 less 8%
Casks	7.50
Open casks	8.00

Metal Prices, February 11, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect Jan. 28, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14½	$0.16¾	$0.18½
Wire	.14¾	.17	.18¾
Rod	.14¾	.17	.19¾
Brazed tubing	.21	—	.23½
Open Seam Tubing	.19	—	.21½
Angles and channels, plain	.20¼	—	.23⅞

30% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	¾c. per lb. net advance
" —Best spring, drawing and spinning brass....	1½c. " " " "
Wire—Extra spring and brazing wire.....	¾c. " " " "
" —Best spring and brazing wire.....	1c. " " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15½	$0.17¾	$0.19½
Wire	.15¾	.18	.19¾
Rod	.15¾	.18	.20¾
Brazed tubing	.22	—	.24½
Open seam tubing	.20	—	.22½
Angles and channels, plain	.21¼	—	.24⅞

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	¾c. per lb. net advance
" —Best spring, drawing and spinning brass....	1½c. " " " "
Wire—Extra spring and brazing wire.....	¾c. " " " "
" —Best spring and brazing wire.....	1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

15¼c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order.....	18½c. per lb. base.
100 lbs. to 300 lbs. in one order.....	19c. " " "
Less than 100 lbs. in one order.....	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 8½ in O. D. Nos. 4 to 13 Stubs' Gauge, 19c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	27	28	21	20	19	19	19	19	19	19	19	20	21	23	25	26

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	15c.	lb. net base
" " " Rectangular sheets other than Sheathing	17c.	" " "
" " " Rod	16c.	" " "
Tobin Bronze Rod	17c.	" " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 23¾c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than..... and including.....	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
	in coils.								
No. 13 and heavier	34	34	36	36	36	36	39	39	39
" 14	34	34	36	36	36	36	39	39	39
" 15	34	34	36	36	36	36	39	39	39
" 16	34	34	36	36	36	36	39	39	39
" 17	34	34	36	36	36	36	39	39	39
" 18	34	34	36	36	36	36	39	39	42
" 19	34	34	36	36	36	36	39	40	43
" 20	34	36	36	36	36	38	41	42	44
" 21	34	38	38	38	38	40	43	44	50
" 22	34	38	38	38	40	40	43	47	51
" 23	34	38	38	38	40	40	43	49	52
" 24	34	38	40	42	42	42	45	51	54
" 25	36	39	41	43	43	43	46	53	57
" 26	36	39	42	46	46	46	51	55	61
" 27	36	40	44	48	48	49	54	58	64
" 28	36	40	46	48	49	49	56	62	67
" 29	38	41	48	50	52	52	61	67	73
" 30	38	42	50	52	56	62	69	72	77
" 31	43	47	55	58	63	71	74	77	83
" 32	45	49	57	61	69	77	91	90	96
" 33	47	51	60	65	73	84	91	100	110
" 34	50	55	62	70	78	91	103	110	120
" 35	..	65	70	80	90	100	115	125	..
" 36	..	80	90	100	115	120	135	..	..
" 37	..	104	114	129	144	159	174	..	..
" 38	..	124	139	154	169	184	204	..	..
" 39	..	144	164	184	204	224	..	..	..
" 40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GUAGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Guage.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	23
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.116	..	45	38	33	32	31	29	28	29	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	..
24.	.022.187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb. ...	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19,	B. & S.	Gauge,	inclusive	$0.66
6	"	"	19,	"	"	"	.76
9	"	"	19,	"	"	"	.85
12	"	"	19,	"	"	"	1.00
15	"	"	19,	"	"	"	1.15
16	"	"	19,	"	"	"	1.20
18	"	"	19,	"	"	"	1.30

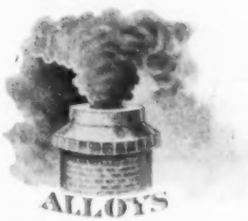
German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. above the price of bullion



METALLIC ALLOYS COMPANY

50 Church Street, New York City

IF it should happen to be a matter of price, quality, or of getting it NOW, no matter what metal or alloy you want

ASK US.

30% MANGANESE COPPER

is an alloy of considerable importance to Brass Foundrymen, whether or not they make Manganese Bronze.

WE ARE

prepared to ship AT ONCE—meaning the same day order is received

Manganese Di-Oxide	Antimony
30% Manganese-Copper	80% Ferro-Manganese
30% Silicon Copper	Outerbridge Silicon Alloy
Aluminum	70% Ferro-Chrome

25/30% Silico-Manganese

BRASS FOUNDERS' SUPPLIES

YOU MAY SAFELY SEND US AN OPEN ORDER

See Next Page for Want Advertisements.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.

METALS, MACHINERY AND SUPPLIES FOR SALE

For Sale Cheap

Second hand machinery only slightly used; Acme Automatic Machines, lathes, presses, grinding machines, drill press, etc. Full information on application. Address, P. O. Box No. 225, Rome, N. Y.

BRASS MOLDERS AND FINISHERS

A good BRASS MOLDER and a good BRASS FINISHER can make good money in Washington, D. C. I will sell out or rent my shop and tools at 1210 E Street, N. W. Business is well established and I shall be glad to send further particulars for the asking.

W. H. DOUGLAS
1210 E Street, N. W. Washington, D. C.

FOR SALE

Foreign rights of a VALUABLE PLATING APPARATUS. A device which means the saving of thousands of dollars in a year's time to any plating establishment. Scrap nickel all consumed. Terms moderate. Address,

FOREIGN PATENT, care THE METAL INDUSTRY, N. Y.

CAST IRON POTS Second Hand For Sale Cheap

Old Material of all Kinds Bought and Sold
WALSH'S SONS & CO., Newark, N. J.

FOR SALE.—Novelty manufacturer can buy a good paying REAL ROSE HAT PIN business very cheap. Formula and equipment complete. Present owner can also be engaged by purchaser. Address HAT PINS, care THE METAL INDUSTRY.

FOR SALE.—WOULD A HUSTLING BRASS MANUFACTURING CORPORATION, with finely equipped shop, near New York, standing orders from large buyers, increasing sales, interest you? Best reasons for selling control. About $30,000 required. Buyer handles business and financial end. Goods patented. Widely catalogued. Demand practically unlimited, efficient sales organization. Principals, come see for yourselves. P. O. BOX 458, Newark, N. J.

PLATING DYNAMOS, also alternating and direct current motors and dynamos at bargain prices, all makes and sizes bought, sold and repaired. Department F. EUGENE L. RICHTER ELECTRIC CO., N. E. Cor. Uber and Columbia avenue, Philadelphia, Pa.

FOR SALE.—A quantity of 4½ in. russet leather 18-ply buffs. Correspond with THE CRANE & BREED MANUFACTURING COMPANY, 1227 W. 8th Street, Cincinnati, Ohio.

FOR SALE—POLISHING and PLATING JOB SHOP in a Michigan city of 28,000 population; no competition. Bargain if taken at once. Reason for selling, other business. Equipment consists of one 5 horse power boiler for heating, one 5 horse power motor, two polishing lathes, good supply of polishing wheels, two plating dynamos (one 150 ampere and one 75 ampere), one 200 gallon nickel tank, one 250 gallon cyanide copper tank, one 75 gallon acid copper tank, one 140 gallon brass tank and one 60 gallon brass tank, also a good supply of anodes for all of these tanks. For further particulars, address BOX 110, care THE METAL INDUSTRY.

WANTED.—ARTISANS and CRAFTSMEN to develop their color sense with "WAGNER'S AUTOMATIC COLOR COMPASS." Fifty beautiful colors in patented device, shows harmonies and graduations. Price $1.00 with lesson. E. F. WAGNER, Studio, 70 Fifth Avenue, New York City.

METALS, MACHINERY AND SUPPLIES FOR SALE—Cont'd

FOR SALE.—A PHOENIX PLATING DYNAMO, about 6 volts, 1,500 amperes in first class condition. Address, THE WEHLE COMPANY, NEWARK, OHIO.

WANTED.—To correspond with buyers of METALLIC BISMUTH and BISMUTH ORES in quantity. Address Box 183, care THE METAL INDUSTRY.

METALS, MACHINERY AND SUPPLIES WANTED

We PAY CASH for GOLD, SILVER and PLATINUM SCRAPS, SOLUTIONS and SWEEPINGS; Old Nickel Anodes, New or Old Mercury, Bismuth, Gas Mantle Dust and Chemicals, etc. EMPIRE CHEMICAL WORKS, 416 East 52d street, New York City.

CASH PAID for bronze Powder Waste, Gas Mantle Dust, Bismuth, Nickel Mercury, Platinum, Osmoiridium and similar metals in any form. JOSEF RADNAI, 36 Fulton street, New York.

OPPORTUNITIES

PLATERS

By enclosing ten cents in stamps we will forward you one of our anode protectors which will save you work and employer money and keep your solution in better condition than formerly. Address,

PLATERS NOVELTY COMPANY
Box 26, Woodhaven, L. I., N. Y.

British New Patents Act

Advertiser is desirous of undertaking the manufacture of American patents in England. Stamped work of all description. Aluminum work a specialty.

WILFRED & CO., Ltd.
BIRMINGHAM, ENGLAND

BRASS FOUNDERS

Practical information bureau, 40 years' experience with trade secrets, from the furnace to the finisher. Work in all known metals, from common brass to the secret process of tempering copper. 40 formulas, worth a thousand dollars.

PREPAID TO ANY ADDRESS ON RECEIPT OF FIVE DOLLARS.

JAMES ALLEN
2552 J Street, : : : SAN DIEGO, CAL.

J. P. FANNING, machinist, 678-Jefferson avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

WANTED.—Reliable parties to canvass for subscription to THE METAL INDUSTRY. Liberal commission. For further particulars address THE METAL INDUSTRY, 61 Beekman street, New York.

GOOD SALES, GOOD EQUIPMENT, GOOD ASSISTANTS and GOOD POSITIONS may be obtained by the insertion of a METAL INDUSTRY WANT.

INQUIRIES.

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY.

Inquiry No. 63.—We would like to hear from producers of cheap tallow for making cutting compound.

Inquiry No. 64.—We would like to hear from platers who can do good work at reasonable prices.

Inquiry No. 65.—We should like to correspond with manufacturers of foundry flasks.

Inquiry No. 66.—We are in the market for zinc wire or lead wire in diameters of 5/32" and 3/16".

Inquiry No. 67.—We would like to correspond with firms making aluminum solders.

Inquiry No. 68.—We would like to have information on a practical cost system for a small jobbing brass foundry.

Inquiry No. 69.—We should like to correspond with manufacturers of polishing machinery for tubes.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.

SITUATIONS OPEN—Commercial

TRAVELLING SALESMAN WANTED

I would like to employ a man to begin at once, who has had experience in the sale of Foundry Facings and Supplies, and also has some knowledge of a plating establishment so he might offer in conjunction Buffing Compositions and Platers' Supplies. Address, stating age, salary required, etc. **SALESMAN,** care of **THE METAL INDUSTRY.**

SELLING AGENT WANTED

The manufacturer of an improved lathe chuck now in successful use in many brass goods shops desires to negotiate with parties who are in a position to handle this device throughout the United States and Canada. Address **CHUCK,** care **The Metal Industry.**

SELLING AGENT WANTED

American representative who desires to act as agent for a new annealing furnace which is suitable for the brass, copper and allied trades. Good opportunity for the right man. Address **FURNACE,** care **The Metal Industry.**

SELLING AGENT WANTED

One familiar commercially and metallurgically with metals to introduce a new bearing metal, the tests of which show excellent results. Address **AGENT,** care **The Metal Industry.**

SITUATIONS OPEN—Metallurgical

WANTED.—MOLDER to do LOST WAX (CIRE PERDUE) MOLDING on fine ORNAMENTAL BRASS and BRONZE CASTINGS. Address MERCURY, care THE METAL INDUSTRY.

WANTED.—SOFT METAL CASTERS, accustomed to handling slush molds. Address THE ART METAL WORKS, 7-15 MULBERRY ST., NEWARK, N. J.

WANTED.—FOUNDRY FOREMAN wanted to sell our equipment on a liberal commission basis. Address BOX 159, care THE METAL INDUSTRY.

WANTED.—FOREMAN to take charge of four MOLDING MACHINES in specialty foundry near New York having no regular molders. Must be willing to do the small amount of bench work required. For particulars address BOX 103, care THE METAL INDUSTRY.

SITUATIONS OPEN—Mechanical

WANTED.—TOOLMAKER; one competent to make tools for rolling and drawing sheet metal. Address THE LUKENHEIMER COMPANY, CINCINNATI, O.

SITUATIONS OPEN—Chemical

WANTED.—PLATER experienced in acid copper solutions. Must be a man who can handle help and understands acid copper plating. Address BOX 194, care THE METAL INDUSTRY.

WANTED.—MERCURY GILDER. Man with experience to do genuine mercury gilding on ornamental brass work. Address MERCURY, care of THE METAL INDUSTRY.

WANTED.—First Class SILVER BUFFER for small plated work. Prefer man who can BURNISH. To such a man a steady position is open. Address BOX 206, care THE METAL INDUSTRY.

SITUATIONS WANTED—Commercial

Advertisements under this head will be insterted for 20 cents per line, 3 lines for Half a Dollar.

SITUATION WANTED.—Superintendent or Manager with a large experience in the manufacture of BRASS GOODS from sheet, rod, tubing and castings. Familiar with all details of factory and office. Also a good salesman. Address BOX 149, care THE METAL INDUSTRY.

SITUATION WANTED.—Sales Agent or Sales Manager open for engagement with BRASS MILL of capacity for the sale of sheet brass, wire, rods, tubing, German silver, pin and hook and eye wires. Thoroughly acquainted with territory people from Connecticut to Chicago and can produce results. J. O. CRANE, care THE METAL INDUSTRY.

SITUATION WANTED.—Experienced BRASS factory man is open for engagement. Thorough executive from FOUNDRY to SHIPPING ROOM. Expert Cost Accountant and Purchasing Agent, Advocate of piece work and bonus systems. Can decrease labor cost and increase output. If you can use a man of my qualifications, address EXPERT, care THE METAL INDUSTRY.

SITUATION WANTED.—SALESMAN experienced in both steam and plumbing lines is open for a position. Thorough acquaintance with the trade in all sections except Pacific Coast. Knows the business thoroughly and can sell goods. Address HUSTLER, care THE METAL INDUSTRY.

SITUATION WANTED.—First class ACCOUNTANT and BUSINESS MANAGER with good experience and reference desires position with reputable manufacturing concern. Address BOX 207, THE METAL INDUSTRY.

SITUATION WANTED.—As SUPERINTENDENT or ASSISTANT SUPERINTENDENT of manufacturing plant, preferably in METAL GOODS. Twenty years' experience, familiar with modern up-to-date methods of producing work at lowest possible cost. First class executive ability. Moderate salary. Can furnish best of references. Address BOX 116, care THE METAL INDUSTRY.

SITUATIONS WANTED—Metallurgical

SITUATION WANTED.—BRASS FOUNDRY FOREMAN or SUPERINTENDENT having had full charge of foundry for 20 years manufacturing car, locomotive, automobile and machinery castings. Can furnish the best of references. Address BOX 183, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class FALSE COREMAKER on architectural bronze and chandelier work. Sixteen years' experience and is capable of running a foundry. Address BOX 180, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class BRASS MOLDER who has had a large experience in foundries around New York. Can furnish the best of reference. Address BOX 196, care THE METAL INDUSTRY.

SITUATION WANTED.—By a CORE MAKER who has had 12 years' experience on all classes of cores, the last three years on CHANDELIER work. Capable of taking charge and can furnish good reference. Address BOX 197, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class CORE MOLDER who has had a large experience in this line. Can furnish reference. Address BOX 198, care THE METAL INDUSTRY.

SITUATION WANTED.—By a BRASS MOLDER who has had 20 years' experience in this line. Can furnish reference. Address BOX 201, care THE METAL INDUSTRY.

SITUATION WANTED.—By a BRASS MOLDER who has had experience in both light and heavy brass work. Is competent of doing any class of brass work. Address BOX 202, care THE METAL INDUSTRY.

SITUATION WANTED.—BRASS FOUNDER with 16 years' experience in all kinds of foundry work. Thoroughly familiar with molding machines, oil furnaces and different mixtures. Have been foreman in several shops and can furnish good reference. Address BOX 203, care THE METAL INDUSTRY.

SITUATION WANTED.—By a BRASS FOUNDRY FOREMAN who has had a large experience in brass foundry work and can furnish good reference from last employers. Address BOX 204, care THE METAL INDUSTRY.

SITUATION WANTED.—BRASS FOUNDRY FOREMAN desires a position. Sixteen years' experience. Up-to-date with molding machines and oil furnaces. Specialties injectors, globe valves, all kinds of steam and plumbers' goods. Address BOX 148, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class COREMAKER who has had a large experience in this line of work. Can furnish the best of reference. Address BOX 137, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class FALSE CORE MOLDER in French sand. Understands all branches in green sand, also in dry work. Position as FOREMAN desired. Can take charge of men. Address BOX 134, care THE METAL INDUSTRY.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.

SITUATIONS WANTED—Metallurgical—Continued

SITUATION WANTED.—FOREMAN MOLDER would like a position. Thoroughly familiar with all classes of work in this line. Address BOX 164, care THE METAL INDUSTRY.

SITUATION WANTED.—Position as FOUNDRY FOREMAN or SUPERINTENDENT in brass. Have had twenty years' experience and can give the best of references. Do my own mixing. Address O-21, care THE METAL INDUSTRY.

SITUATIONS WANTED—Mechanical

SITUATION WANTED.—By a first class BRASS WORKER who has had 10 years' experience on bench, speed lathe, brazing and different kinds of jobbing work. Good reference from last employer. Address BOX 200, care THE METAL INDUSTRY.

SITUATION WANTED.—BRASS TURNER who has had a large experience as foreman would like to hear from any firms who are in need of such a man. Can furnish good reference. Address BOX 205, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical

SITUATION WANTED.—METAL POLISHER with 25 years' experience, particularly in brass and copper, is open for engagement. Capable of taking charge and would prefer an out of town position. Address BOX 181, care THE METAL INDUSTRY.

SITUATION WANTED.—Chaser experienced on repousse work desires a position. Out of town preferred. Address BOX 182, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PRACTICAL PLATER. Can plate on all metals and produce all finishes. Experienced in deposition and etching. Twenty years' experience and is thoroughly capable of taking charge. Address ORMOLU, care THE METAL INDUSTRY.

SITUATION WANTED.—By a competent PLATER who thoroughly understands the plating business from beginning to end. Is capable of taking charge and can furnish the best of references. Address BOX 184, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER who understands every branch of solutions, dips, dynamos, polishing, grinding, cutting down, etc. Has had 20 years' experience with one firm who will give the best of references. Thoroughly familiar with any kind of work; up-to-date and hustler. Address BOX 186, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first-class POLISHER and BUFFER; 13 years experience and now foreman in charge of large shop. Address POLISHER, care THE METAL INDUSTRY.

SITUATION WANTED.—By an experienced PLATER in nickel, copper, brass and silver, also dipping and oxidizing. Thoroughly understands all finishes and can furnish best of references. Address BOX 187, care THE METAL INDUSTRY.

SITUATION WANTED.—A FIRST CLASS PLATER who desires a position as foreman, who has had 22 years' experience in polishing, plating and buffing. Address BOX 188, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER, buffer, polisher, dipper and lacquerer who has had a large experience on chandelier work. A good steady worker who can furnish the best of references. Address BOX 189, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER who has had 18 years' experience in nickel, copper and brass plating, also oxidizing. A large experience in steel range work and heaters. Have had charge of polishing, plating and buffing departments and can furnish the best of references. Address BOX 190, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 12 years' experience on nickel, copper, brass, oxidizing and all the different finishes. Position in Chicago or vicinity preferred. Can furnish best of references. Address BOX 191, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER thoroughly familiar with oxidizing and refinishing. Has had 18 years' experience and is capable of taking charge. Can furnish the best of references. Address BOX 192, care THE METAL INDUSTRY.

SITUATION WANTED.—By PLATER, second man on brass, nickel, silver, copper. Understands all finishes. Out of town preferred. Address BOX 132, care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN of polishing, plating and buffing departments who is thoroughly experienced on brass goods, fine mechanical tools and machinery. Twenty years' experience, 7 years of foremanship. Up-to-date, able to handle help to best advantage, to turn out work at low cost, sober, reliable and can furnish the best of reference from my last two employers. Address BOX 193, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED—By a FOREMAN PLATER with fifteen years' experience as plater and polisher. Can handle with excellent results Gold, Silver, Copper, Nickel, Brass and Bronze Solutions and their different finishes. Can furnish good reference. Address, BOX 158, care THE METAL INDUSTRY.

SITUATION WANTED—First class PLATER and FINISHER who can make all solutions, also do fancy coloring and polishing on silverware and jewelry. Has had nine years' experience on new and old work. Would like steady position. Address BOX 136, care THE METAL INDUSTRY.

SITUATION WANTED.—By a Silver, Nickel, Copper, Brass or Gold Plater who is willing to start at a moderate salary. Can furnish the best of references. Address BOX 185, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO PLATER at present in charge of a large plant in Western Connecticut who would like to make a change. Broad, practical experience. Economical and up-to-date methods. Familiar with all solutions and finishes. Address BOX 146, care THE METAL INDUSTRY.

SITUATION WANTED.—By a plater who thoroughly understands the plating, polishing, oxidizing and enameling on iron and brass. Long experience as foreman of different departments in plating plants. Address BOX 177, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had a long experience as Foreman of Plating, Polishing and Buffing Departments. Thoroughly familiar with all solutions and can furnish the best of reference. Address BOX 178, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had 14 years' experience in the plating trade. Understands all solutions and can furnish the best of reference. Address BOX 179, care THE METAL INDUSTRY.

SITUATION WANTED.—By an expert NICKEL and COPPER PLATER who can furnish the best of reference. Address BOX 180, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO-PLATER, 18 years' experience with Nickel, Copper, Brass and Bronze solutions and oxidizing. Can furnish good reference. Address BOX 181, care THE METAL INDUSTRY.

SITUATION WANTED.—By an all round DEPOSIT EXPERT. Practical man in all its branches. A first class Designer, Engraver, and Etcher, having a fine white paint, one paint for silver and china. Also plate wood, horn and natural flowers and ornamental electrotyping on rubber. Address, BOX 182, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER to take charge of a coloring room in a jewelry shop. Thoroughly familiar with all up-to-date colors. Can furnish reference. Address BOX 157, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who can handle help to advantage. Can also do polishing and buffing. Nine years' experience, and can furnish best of reference. Address BOX 165, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had a long experience in the plating business. Thoroughly understands all solutions and finishes. Address BOX 166, care THE METAL INDUSTRY.

SITUATION WANTED.—By an all round PLATER who has had considerable experience on all kinds of work, such as hollowware, chandeliers, jobbing, etc. Thoroughly understands all solutions, oxidizing and dipping. Address BOX 167, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 15 years' experience, thoroughly understanding all solutions, silver deposit, galvano plastic work, etc. Address BOX 169, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER, POLISHER and BUFFER with 15 years' experience. Hustler and can produce good work. Sober, reliable and can furnish the best of reference from my last employer. Would like to locate west of Chicago. Address BOX 150, care THE METAL INDUSTRY.

SITUATION WANTED.—As plater or foreman plater, with 25 years' experience. Also understands buffing and polishing. Address Box 155, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER with 18 years' experience in plating business, 10 years' experience as foreman of plating and buffing departments. Address BOX 156, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who thoroughly understands plating on all metals, especially ormolu, French gray, nickel, brass, copper. Also experienced in silver finishing, soft metal polishing on steel or brass. Address BOX 152, care THE METAL INDUSTRY.

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SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED.—By a PLATER with 30 years' experience in all kinds of finishes. Expert on ROYAL COPPER. Wages expected $15.00-$18.00. Can furnish the best of reference. Address BOX 144, care THE METAL INDUSTRY.

SITUATION WANTED.—By PLATER with 28 years' experience in all metals, including platinum. Should be glad to hear from firms desiring the services of a first class plater. Address BOX NO. 8, care THE METAL INDUSTRY.

SITUATION WANTED.—As a FOREMAN or ASSISTANT FOREMAN PLATER. Thoroughly familiar with all kinds of plating, oxidizing, etc. Address BOX 171, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER of 16 years' experience, understanding all solutions, including verde antique. Address BOX 172, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 12 years' experience, thoroughly understanding all details of the plating trade. Can furnish excellent reference. Address BOX 173, care THE METAL INDUSTRY.

SITUATION WANTED.—A first class PLATER who is at the present time employed but desires to change, would like to hear from firms desiring a man who thoroughly understands the plating, buffing, etc., of all metals. Address BOX 174, care THE METAL INDUSTRY.

SITUATION WANTED.—By a young man who has had 8 years' experience. Can do all kinds of PLATING and FANCY COLORING. Address BOX 175, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who is an expert on NICKEL, BRASS and COPPER PLATING. Would like to secure a position with a good automobile company or a firm that has a large NICKEL PLATING PLANT. Address O-15, care THE METAL INDUSTRY.

SITUATION WANTED.—By a First Class PLATER with several years' experience. Can furnish the best of references. Address O-20, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class GOLD, SILVER, NICKEL, BRASS or COPPER and all round PLATER to take charge of large plating plant. Can give the best of references and will consider no position unless steady. Address O-13, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class ELECTRO PLATER. Brass solutions a specialty, also Gold, Silver, Nickel and antique finishes. Can furnish the best of references. Address L. H., care THE METAL INDUSTRY.

SITUATION WANTED.—In a SILVER MANUFACTURING PLANT or in a PLATING ROOM by a Superintendent and Foreman. Twenty years' experience in all kinds of plating, and is thoroughly familiar with all the different finishes. Expert in plating NON-METALLIC SURFACES. Address BOX 142, care THE METAL INDUSTRY.

SITUATION WANTED.—By a plater who has made a specialty of GALVANO PLASTIC WORK. Can furnish the best of reference. Address BOX 143, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED.—NICKEL and BRASS PLATER. Forty years old, sober and industrious. Experienced in the making of all solutions. Steady position desired. Moderate wages. Address BOX 133, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER thoroughly understanding Brass, Bronze, Cyanide Copper, Acid Copper, Nickel, Black Nickel, Silver, Electro and Dip Gold Solutions. Can produce Rose Green, Ivory, Roman Gold, Silver Oxidize and different finishes in the novelty and buckle line. Burnishing and Lacquering in all details. Address N-4, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER of 18 years' experience; 12 years as FOREMAN for large concerns. Thoroughly up-to-date on all solutions, dips and finishes, including Silver Deposit, etc., and rapid methods of turning out work. Sober, reliable and industrious, and can furnish the best of references. Would like to hear from firms desiring the services of a first class man. Address O-17, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER on Gold, Silver, Black Nickel, Brass, Bronze and Tin. Plating Verde Green, Oxidizing. Address O-22, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER thoroughly familiar with Nickel, Silver, Brass, Copper plating and oxidizing. Can furnish the best of reference. Address BOX 140, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who thoroughly understands polishing and buffing. Large experience on plumbers' supplies, builders' hardware and job shop work. Thoroughly capable of taking charge of plating room. Address BOX 135, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER, POLISHER and BUFFER. Twenty years' experience in all branches of plating work. Expert in all solutions and finishes, silver deposit, galvano plastic, metallizing non-metallic subjects, cold galvanizing, lacquering. Sober, reliable, and can furnish the best of reference. Address BOX 151, care THE METAL INDUSTRY.

SITUATION WANTED.—Foreman NICKEL PLATER and POLISHER. Large experience in stove works, and would prefer such a position. Address BOX 130, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER up-to-date in ALL FINISHES. Six years' experience and can furnish the best of reference. Address BOX 131, care THE METAL INDUSTRY.

SITUATION WANTED.—By FIRST CLASS PLATER AND POLISHER. Has had 16 years' experience and had charge of men for the last 10 years. Can handle any kind of a plant, understands all finishes and can give good reference. Address O-19, care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN PLATER desires a position with NOVELTY OR BUCKLE MANUFACTURER. Thoroughly familiar with all solutions and finishes on BRASS, German Silver, Britannia and Soft Metals. Can take charge of help to advantage. Address BOX 145, care THE METAL INDUSTRY.

Have You a Want?

¶ Let it be known in THE METAL INDUSTRY Trade Wants, and you will get what you want. Everyone does.

¶ Our Want Ad. Page is a Regular Exchange for supplying the immediate wants of the Metal Trades.

¶ Answers sent in our care will be forwarded.

¶ Send your want in at once and be happy.

¶ Have you a list of THE METAL INDUSTRY Books and Special Offer to Subscribers? Furnished free for the asking.

¶ THE METAL INDUSTRY, 61 Beekman Street, New York.

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COPPER FIREBOX PLATES
and STAYBOLTS
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IMPORTERS AND DEALERS IN
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BISMUTH, NICKEL, Etc.
49 Cliff Street, NEW YORK

Established 1802 Cable Address: "Scovill"
SCOVILL MFG. CO.
WATERBURY, CONN.
THE LARGEST AND MOST FULLY EQUIPPED BRASS ROLLING MILLS AND METAL GOODS MANUFACTURING ESTABLISHMENT IN THE WORLD
Estimates for Specialties in Brass, German Silver and Aluminum furnished on application. DEPOTS:
NEW YORK: 75 Spring St. BOSTON: 170 Summer St. CHICAGO: 210 Lake St.

WATERBURY BRASS CO.
General Offices, Mills and Factories.
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Providence (R. I.) Store, 131 Dorrance St.
Shipments Upon Receipt of Order
From Large Stock of
SEAMLESS DRAWN BRASS AND COPPER TUBING
BRASS { SHEET ROD WIRE
COPPER { SHEET ROD WIRE
GERMAN SILVER { SHEET ROD WIRE
AT WATERBURY

Non-Corrosive Finest Quality
COPPER AND YELLOW
(Muntz) Metal
Naval Brass
Naval Bronze
Manganese Bronze
Plates, Sheets, Bolts, Bars, Rods, Nails, Tacks, &c.
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PITTSBURGH, PENNA.
Manufacturers of
COPPER
In Sheets, Plates, Rolls
ANODES
Tacks and Nails

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BRIDGEPORT, CONN.
Postal Telegraph Building,
Broadway and Murray St., New York
17 N. 7th Street, Philadelphia
Manufacturers of
Brass and Copper { Sheet Tubing Wire and Rods.
Metal Goods Made to Order from Sheet, Rod, Wire and Tubing

BRASS and COPPER in Sheets and Rolls
SILVER PLATED METAL (for Coach Lamps)
BRITANNIA METAL
B. & M. BABBITT METAL for Bearings
LINING METAL for Automobile Bearings and Copper for Electrical Purposes
H. K. & F. S. BENSON
GLEN RIDGE, N. J.

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
German Silver
BRASS, COPPER and BRONZE IN SHEETS, WIRE, RODS and TUBES
COPPER AND NICKEL ANODES
Resistance Wires, Wire, Shot Copper

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ROME, N. Y.
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SMALL SIZES THIN GAUGES
SPECIAL SHAPES
FOR ALL PURPOSES

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SOLE MANUFACTURERS TOBIN BRONZE
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2200 WASHINGTON AVENUE, PHILADELPHIA, PA.
ELEPHANT BRAND "Phosphor Bronze"
INGOTS, CASTINGS, WIRE, RODS, SHEETS, Etc.
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ORIGINAL AND SOLE MAKERS IN THE U. S.

210

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FOR TWELVE YEARS

we have been manufacturing a high-grade Acid-Proof Vitrified Non-Absorbent Brick suitable for Acid Tanks, Plating Room flooring, etc., etc.

These bricks immersed in a 50% Sulphuric Acid solution for several months show no signs of deterioration.

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METAL ROLLING MILLS.

INGOT, SHEET, ROD, WIRE, TUBE, METAL GOODS.

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COPPER FIREBOX PLATES
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SEAMLESS DRAWN BRASS AND COPPER TUBING
BRASS {SHEET ROD WIRE} COPPER {SHEET ROD WIRE}
AT WATERBURY GERMAN SILVER {SHEET ROD WIRE}

Non-Corrosive — Finest Quality
COPPER AND YELLOW
(Muntz) Metal
Naval Brass
Naval Bronze
Manganese Bronze
Plates, Sheets, Bolts, Bars, Rods, Nails, Tacks, &c.
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LINING METAL for Automobile Bearings and Copper for Electrical Purposes
H. K. & F. S. BENSON
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THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
German Silver
BRASS, COPPER and BRONZE IN SHEETS, WIRE, RODS and TUBES
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Resistance Wires, Wire, Shot Copper

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99 John St., New York
MANUFACTURERS OF
BRASS and COPPER Sheets, Tubes, Rods and Wire
SOLE MANUFACTURERS TOBIN BRONZE
(Trade-Mark Registered)

PHENIX TUBE CO.
Manufacturers of
Brass and Bronze Iron Lined Tubes
Brazed Steel Tubes,
Round and Square.
Main Office and Mills: Brooklyn, N. Y.
City Branch Offices: Chicago, San Francisco

Baltimore Copper Smelting and Rolling Company
BALTIMORE, MARYLAND
SHEET COPPER

"RIVERSIDE" German Silver
Phosphor Bronze
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys
The Riverside Metal Co.
Riverside, Burlington Co., N. J.

ELEPHANT BRAND
DELTA
REG. U. S. PAT. OFF.

THE PHOSPHOR BRONZE SMELTING CO., Limited.
2200 WASHINGTON AVENUE, PHILADELPHIA, PA.
ELEPHANT BRAND *Phosphor Bronze*
INGOTS, CASTINGS, WIRE, RODS, SHEETS, Etc.
— DELTA METAL —
CASTINGS, STAMPINGS AND FORGINGS
ORIGINAL AND SOLE MAKERS IN THE U. S.

210

Jewelry and Novelty Makers

Leaders in their respective lines used our products in their coloring rooms in 1908.

Were YOU With Us?

Our C. P. Gold for Rose or Roman Work
Our Green Gold Our Oxidizing Fluid
Our 12, 14 and 16K Anodes

H. F. CARPENTER & SON

GOLD AND SILVER REFINERS
ASSAYERS AND SWEEP SMELTERS

58 & 60 Page St., Providence, R. I.

"THE C. P. GOLD PEOPLE"

SWAN & FINCH COMPANY

ESTABLISHED 1853. INCORPORATED 1892.

Direct Importers of Palm, Cocoanut, Olive and Cod

OILS

Refiners and Dealers in All Grades of Lubricating Oils and Greases, including Tempering Oils, Fish and Whale Oil Soaps, and

PLATERS' COMPOUND

HOME OFFICE:
151 Maiden Lane - New York

Patent Applied for

LET OUR TANK DO YOUR CLEANING

METAL DROSS REFINING CO.,
Bristol, Conn., U. S. A.

Acid-Proof Brick

FOR TWELVE YEARS

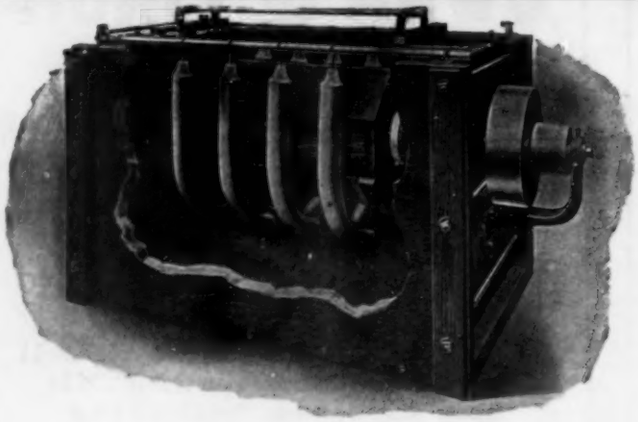
we have been manufacturing a high-grade Acid-Proof Vitrified Non-Absorbent Brick suitable for Acid Tanks, Plating Room flooring, etc., etc.

These bricks immersed in a 50% Sulphuric Acid solution for several months show no signs of deterioration.

INQUIRIES SOLICITED.

NEW YORK BRICK & PAVING CO.
Syracuse, N. Y.

MECHANICAL ELECTRO-PLATING APPARATUS



STYLE "B"

Patented June 22, 1897, Feb. 24, 1903, Oct. 11, 1904.
Other patents pending.

The most efficient plating apparatus in the market. Over 500 in use by the trade.

We will finish sample lots of work without charge.

This apparatus is a proved money saver where small work is to be plated. Can be used in Nickel, Copper, Brass, Zinc and Silver Solutions.

No Stringing. No Wire Used. No Metal Plating Trays or Baskets. No Unstringing. No Loss of Metal.

Capacity: 50 lbs. to 500 lbs., according to size.

Basket can be removed at will—without interfering with drive. In larger sizes basket is raised and lowered automatically.

Useful for plating: Bolts, Nuts, Rivets, Screws, Buckles, Ferrules, Typewriter and Sewing Machine Parts, Lamp Fixtures, Saddlery and Trunk Hardware, Carriage Trimmings, Screw Tops, Shells, Stove Fittings, Locks, Keys and small work.

Apparatus is Used for Electro-Galvanizing Small Articles

We Can Furnish a List of Over 200 Users of this Apparatus. Many of the Larger Firms Are Using 10 or more

WRITE FOR BULLETIN No. 113

The HANSON & VAN WINKLE COMPANY

Manufacturers of Dynamos from 50 to 5,000 Ampere Capacity, and all Supplies for Electro-deposition.

(WRITE FOR BULLETINS 105 and 112)

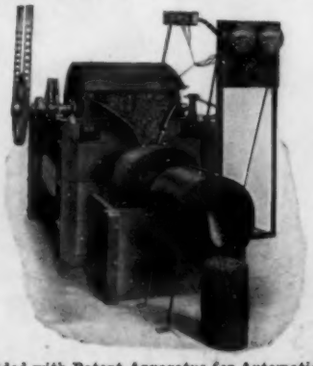
Main Office and Factory
219-221 Market Street,
NEWARK, N. J., U. S. A.

Branches
28 South Canal Street,
CHICAGO, ILL., U. S. A.

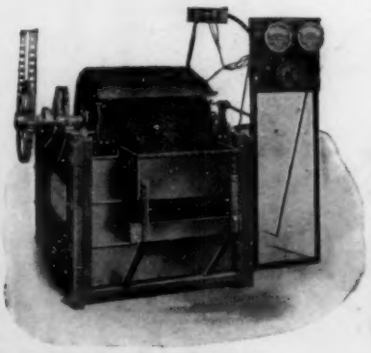
PATENT AUTOMATIC SELF-EMPTYING PLATING BARREL

For Electro Galvanizing, Nickel, Brass and Copper Plating, etc.

View while Plating.



Provided with Patent Apparatus for Automatically Washing, Drying, Delivering Material.



View while Emptying.

These Operations are Accomplished by Simply Reversing Motion of Barrel.

ELECTRO PLATING AND GALVANIZING OUTFITS

BY USE OF OUR PATENT HANDLING DEVICES SAVING OVER 50 PER CENT. IN LABOR COST.

DYNAMOS UP TO 8,000 AMP. POLISHERS' AND BUFFERS' MACHINERY AND SUPPLIES, CHEMICALS, ANODES (CURVED), LACQUERS, ETC.

U. S. ELECTRO GALVANIZING CO.

Main Office and Factory,
No. 1-9 Park Ave.

BROOKLYN, N. Y.

Branch and Warehouse,
229 Pacific St.

THE TRIPLEX BUFF

A New Buff that is rapidly supplanting all other kinds. The letters printed below prove that old style Buffs are now obsolete

In 1907 this Buff was patented; since then its success has been almost phenomenal. The secret of its great wearing qualities is in the FOLD. Its economy is due to the fact that EVERY STRAND OF MUSLIN is used up in doing actual work. When the wheels are worn down the stubs may be returned to us and made into new wheels at nominal cost, using two old wheels to make one new wheel of approximately double the diameter of the old. Read what a few of our customers say:

Victor Talking Machine Co., Camden, N. J.

With one [Triplex] wheel we buffed four hundred pieces of our part 714A and three hundred pieces of our part 705A, while with one of our regular buffs we can do only two hundred pieces of our part 714A and two hundred and fifty pieces of 705A, both buffs using about the same amount of Tripoli, but the Triplex buff is much cleaner. Therefore, according to this report, the Triplex buff does more than again as much work as an ordinary buff.

Pittsburgh Lamp, Brass and Glass Co., Pittsburgh, Pa.

We have been using buffs made under the Painter Patent since June 18th last, and notwithstanding our increased business this year, our saving in buffs alone has been about $500, and we feel safe in saying that these savings will exceed at the rate of $100 per month for the year 1907. Our foreman's account shows that one wheel made of eight sections, eighteen ply each, under the Painter system, has done as much work as three wheels of same dimensions and quality made of loose buffs. In Tripoli composition we find a saving of about 20 per cent.

In addition to the above, our men are doing more work, better work, and they claim with an expenditure of less labor and physical force.

The Bryant Electric Co., Bridgeport, Conn.

We consider them to be the best buff we have ever used at any price, and we expect to use them practically exclusively when our stock of the old type is exhausted.

John L. Gaumer, Philadelphia, Pa.

Economy, therefore, will dictate that your Patent Buffs will take the place of the old methods.

Send for Description of our New Two-Bar Silverite Nickel Anode

IMPORTANT NOTICE

Any folded buff not stamped with our trade mark "TRIPLEX," used or sold is an infringement on our license patent and our rights in this respect will be strictly enforced.

We will gladly send a man to demonstrate these wheels on your own work. Send in your orders NOW—they will be filled in regular order at current prices. Send for descriptive bulletin TB.

ZUCKER & LEVETT & LOEB CO., New York City, U. S. A.

Electro-Galvanizing Outfits Without Royalty on Solution. Low Voltage Generators; and Direct Connected Generator Sets, 50 to 10,000 Amperes Capacity. Complete Plants Installed and All Supplies for Electro Plating and Polishing.

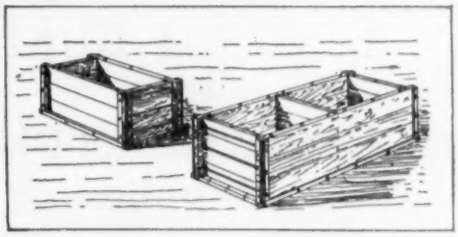
¶ Send for a List of the Principal Articles on the Founding, Finishing and Plating of Metals, that appeared in

The Metal Industry

IN 1906, 1907 and 1908

The Most Valuable Ever Published

TANKS



Electro-Plating Tanks

A SPECIALTY

Write for Prices

THE A. T. STEARNS LUMBER CO., Neponset, Boston, Mass.

NICKEL SALTS AMYL ACETATE
CYANIDE POTASH
BISMUTH CADMIUM

These are only a few of the chemicals sold by us. Send for complete list.

We have high grade material at low prices.

FOR PLATERS AND BRASS MANUFACTURERS

Correspondence Solicited

McKESSON & ROBBINS

Manufacturing Chemists **NEW YORK**

"ELECTRIC" CLEANING COMPOUND

IS ADAPTED FOR CLEANING ALL METALS BEFORE PLATING

Cleveland, O., January 4, 1909

Cleveland Platers Supply Co., City

Gentlemen:—I have had charge of the plating department of The North Electric Co., of this city, for the past four years, and have been using your "Electric" Cleaning Compound since November, 1907. Prior to the time of trying out your compound, I had been using a cyanide and potash electric cleaner continually for three years.

My fourteen months' experience with your compound has demonstrated that it is a better cleaner, in every respect, than the cyanide and potash cleaner. Not only does the "Electric" compound clean all of my polished brass and steel work thoroughly, but I also use it for cleaning large quantities of soldered tin boxes, and also zinc transmitter fronts. Before using your material, this tin and zinc work had to be hand scrubbed, as it could not be cleaned in the cyanide and potash cleaner without becoming badly stained and oxydized.

Our work consists of telephone parts, and our output is very large, but I do not find it necessary to scrub any of the work.

The expense for making up and maintaining your cleaning solution is about one-half as much as for the cyanide and potash cleaner. Yours truly,

THOS. SWEENEY

(Publication of above letter sanctioned by The North Electric Co.)

Sold only by

CLEVELAND PLATERS SUPPLY CO.

113 St.Clair Ave., N. E. Cleveland, Ohio

"CLEANING BY ELECTRICITY," a booklet on electric cleaning, mailed free to any address.

If You Make

Buffing Compositions, Metal Polishes, Polishing Rouges, Scouring Soaps, Cleaning Compounds, or anything of similar nature, you ought to investigate

Missouri Tripoli Flour

It may be better suited for your purposes than the material you now use. *It may save you money.*

MISSOURI TRIPOLI FLOUR is made in all grades and colors—"Rose," "Cream" and "White." It is the most effective VERY FINE abrasive known. Our finest grade—"Air Dust"—is an impalpable powder, and yet a very fine abrasive.

MISSOURI TRIPOLI STONE, it its natural state, or the flour, will absorb 50% of its own weight of fluids of the consistency of water. We also make TRIPOLI STONES FOR WATER FILTERS.

Prices upon application.

American Tripoli Company

SENECA, MISSOURI

E. REED BURNS

MANUFACTURER OF

Brass and Nickel Platers' Supplies

40 and 42 WITHERS STREET
BROOKLYN, N. Y.

WRITE FOR PRICES

WESTERN AGENCY 20 No. Desplaines Street, CHICAGO

SEE PAGE 41 FOR

The Metal Industry BOOKS

On Metals

AND SPECIAL OFFER TO SUBSCRIBERS

ESTABLISHED 1888 **TELEPHONE 2577 SPRING**

PHILIP SIEVERING

ELECTRO PLATER AND POLISHER

NICKEL PLATING A SPECIALTY

JOBBING IN ALL ITS BRANCHES

255-257-259 Centre Street,
Corner Broome Street,
NEW YORK CITY

Gold, Silver, Copper, Brass and Bronze Plating
Polishing and Buffing
Acid Dipping and Lacquering

"A Composition for Cheapness,

and not for excellence of workmanship, is the most frequent and certain cause for the rapid decay and entire destruction of arts and manufacture."

The Lacquer has more to do with selling your goods than any other one thing. Why not use the reliable "NIKOLAS" brands and thereby prevent destruction?

G. J. NIKOLAS & CO.

85 Centre Street, NEW YORK — 400 W. Van Buren Street, CHICAGO

ZAPON SPRAY LACQUER

(Zapon K-1215)

CELLULOID ZAPON CO.

Works: STAMFORD, CONN.

Sales Department: 310 FOURTH AVE., NEW YORK CITY
Metropolitan Building

GET IN LINE

with your competitors and apply your Lacquer, Paint, Japan, etc., with the original Eureka Sprayer. Avoid infringements. Get the benefit of nine years of experience as specialists. Sprayers and Air Brushes for every purpose from $6.00 up.

Get catalogue of New Record Sprayer.

Eureka Pneumatic Spray Co.,

400 Canal Street — NEW YORK

IT'S FOR YOUR BENEFIT

We do not expect you to use Egyptian Lacquer until you're thoroughly convinced that there's a BENEFIT to be derived from it.

If you haven't found it out, test it the next time you buy, and you will get greater profit from your work as the result.

The Egyptian Lacquer Manufacturing Company

152 Front Street, New York City

"New Era" Lacquers HAVE QUALITY

We Buy Quality, Talk Quality, GIVE QUALITY

"Quality is the underlying principle of the most successful businesses."

The manufacturer who calls your attention to the low price of his product has little else to talk about. While we try to keep within the bounds of Low Prices, we do not make a specialty of it.

We can satisfy anyone who is wise enough to see the value of the BEST regardless of the shade difference in the cost.

THE NEW ERA LUSTRE CO.

NEW HAVEN - - - - - - - - - - CONN

"Noflux" Aluminum Solder does the WORK and does it right. Send 25c. or 50c. for sample bars, full description, and direction sheets, and be convinced. Joins aluminum to aluminum and to other metals perfectly. Thousands of pleased users.

E. M. & R. CO.,
Sunday Call Building
NEWARK, N. J.

FRENCH LACQUERS (Vernis Mixtions)

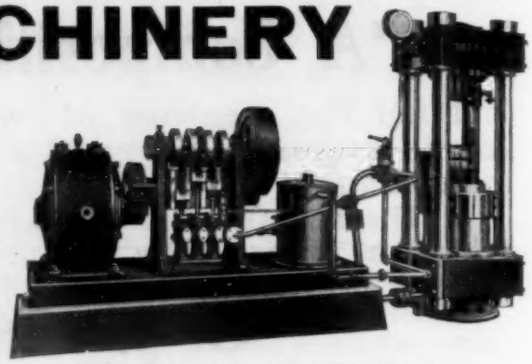
have proven indispensable for Ornamental Bronze and Art Metal work.

PAUL UHLICH & CO., 81 Fulton Street, N. Y.

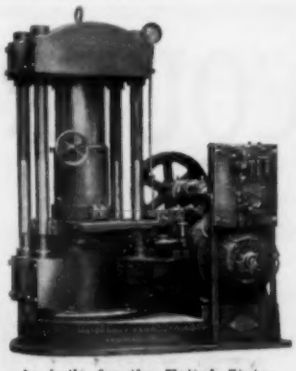
Clear, Antique and Colored Lacquers, Sanguines, Metal Colors, etc., always in stock.

HYDRAULIC MACHINERY

used in various industrial operations, such as the manufacture of tubing of all kinds, either seamless or brazed, of steel, copper, brass, or other material; drawn rods and shafting; cups for tanks, hot water boilers, large cartridges, or similar articles; embossed and stamped coins, medals and watch cases; punching thick blanks from sheet metal; heading, drawing, piercing, or other operations on large cartridges; stamping or pressing cold such articles as sprocket wheels, fancy hardware, leather, paper; squirting wire for fusible plugs and bullets; pressing and cooling composition eyelets, celluloid goods, insulating materials and emery wheels; testing tubing and cast iron water pipe; piercing and forming steel projectiles and bottles.



500-Ton Press, Triplex Pump, Motor Drive, for Heading Cartridge Cases for Army.



As built for the United States New Mint at Denver.

Cartridge, steel and brass tubing, celluloiding and other plants will be furnished to suit customers.

We will plan and build the piping and valves suitable for connecting our pumps and accumulators with the machines they operate. The large number of drawings and patterns which we have accumulated make it possible to build these special valves at a minimum cost to the purchaser.

The important features of first-class **materials** and ample proportions of parts accompanied by the **best workmanship** in construction are recognized and are consistently followed in the machines which are described in catalog "H."

The Waterbury Farrel Foundry and Machine Co.,

WATERBURY, CONN., U. S. A.

Western Office, Cleveland, Ohio, 1012 Williamson Bldg.

IT'S EASY IF YOU KNOW HOW!

If you are making steel castings, and you would steal the effect of the mirror, use STEVENS' STEEL POLISH for cutting down, and STEVENS' WHITE ROSE COMPOSITION for "high coloring"—on Cotton Buffs. The cutlery manufacturers have cut their competitors' trade in just that way, for the beautiful effect produced in this way goes a long ways in the sale of goods.

TRIPOLI COMPOSITION—More concentrated energy in one pound of my composition than in twice the quantity of any other.—There's a reason for it.

WHITE COLUMBIA COLORING—A buffing Composition for "coloring up" brass castings.

STEVENS' SILVER FINISH—Another, for buffing nickel plates with deep back-grounds where the dead white finish is desired. The one buffing composition that has contributed much to the success of the stove industry.

I manufacture Canvas Wheels, Bull Neck Wheels, and a complete line of Polishing and Plating Compositions—Crocus Composition, Emery Cake, etc.

Pocket-book satisfaction guaranteed.

I manufacture also, FOUNDRY FACINGS and SUPPLIES, and each article is a trouble eradicator.—Tell me your troubles.

FREDERIC B. STEVENS

DETROIT, MICH.

FACING MILL
Cor. Isabella Ave. and M. C. R. R.

WAREHOUSE AND OFFICE
Cor. Larned and Third

EXPORT WAREHOUSE
Windsor, Ont.